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UNITED STATES DEPARTMENT OF AGRICULTURE

DEPARTMENT BULLETIN No. 1177

Washington, D. C. ▼ September 22, 1923

IRRIGATION DISTRICT OPERATION AND FINANCE

By

WELLS A. HUTCHINS, Assistant in Irrigation Economics
Division of Agricultural Engineering, Bureau of Public Roads

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By WELLS A. HUTCHINS,[1] *Assistant in Irrigation Economics, Division of Agricultural Engineering, Bureau of Public Roads.*

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INTRODUCTION.

Thirty-five years have elapsed since the passage by the California Legislature in 1887 of the Wright Act, authorizing the formation of irrigation districts. During this time the district movement throughout the West has encountered many changes of fortune, but it is more widespread and economically important to-day than ever before. As a result of two periods of district speculation and failure there still exists in some quarters a belief that all irrigation districts are speculative enterprises and a consequent prejudice against investing in district bonds. On the other hand, the district is now so popular in many of the Western States that tendencies have sometimes developed recently toward organizing projects which may contain the elements of failure. It is hoped that the data presented and conclusions reached in this bulletin may disabuse the minds of uninformed investors who cling to the idea that all irrigation districts are unsound, and at the same time may be of value to State officials and to communities contemplating the formation of irrigation districts in pointing out what the experience of other communities has shown to be the essentials of success.

NATURE OF IRRIGATION DISTRICTS.

The irrigation district may be defined as a public or quasimunicipal corporation, organized under State laws for the purpose of pro-

[1] The earlier work of the department on irrigation districts was done largely by or under the direction of Frank Adams. The more recent field work has been done by Justin T. Kingdon, Guy Ervin, Harold A. Wadsworth, and the author.

viding a water supply for the irrigation of lands embraced within its boundaries, possessed of power to issue bonds, and deriving its revenue primarily from assessments levied upon the land.

The fundamental attributes of an irrigation district are:

(*a*) It is a public corporation, a political subdivision of a State, created under authority of the State legislature through the county governing body at the instance of the landowners or citizens, as the case may be, of the particular territory involved. Being public and political, the formation of a district is not dependent upon the consent of all persons concerned, but may be brought about against the wishes of the minority. In this respect the district differs fundamentally from the voluntary cooperative or the commercial irrigation company.[2]

(*b*) It is a cooperative undertaking, a self-governing institution, owned, managed, and operated by the landowners or citizens within the district. Supervision by State officials is provided for to the extent of seeing that the laws are enforced, and in most States is extended in greater or less degree over organization, plans and estimates prior to bond issues, and construction of works.

(*c*) It may issue bonds for the construction or acquisition of irrigation works, which bonds are payable from the proceeds of assessments levied upon the land.

(*d*) Hence, it has the taxing power. Each assessment becomes a lien upon the land. While the ultimate source of revenue, therefore, is the assessment, an additional source frequently provided for is the toll charged for water. Other revenue may in some cases be obtained from the sale or rental of water or power to lands or persons outside the district.

(*e*) Finally, the purpose of the irrigation district is to obtain a water supply and to distribute the water for the irrigation of lands within the district. Additional authority is granted irrigation districts, almost without exception, to provide for drainage. In some States districts may also develop electric power. These additional powers, however, are subsidiary and are intended to make more effective the principal function of the organization, which is to provide for irrigation.

In recent years other types of districts for irrigation purposes have been authorized in several States, in addition to the usual type of irrigation district to which this discussion refers.

Table 1 summarizes by States the irrigation districts formed to December 31, 1921, and Figure 1 shows their location.

---

[2] The constitutionality of the irrigation district law was upheld by the United States Supreme Court in the case of Fallbrook Irrigation District *v.* Bradley, 164 U. S. 112, decided November 16, 1896. For a discussion of the legal nature of the irrigation district, reference is made to the Handbook of the Irrigation District Laws of the Seventeen Western States of the United States, by Will R. King, chief counsel, U. S. Reclamation Service, and E. W. Burr, district counsel, U. S. Reclamation Service. This publication contains a discussion of the powers and functions of irrigation districts, with references to decisions of the courts, and abstracts of the various irrigation district statutes in force in 1919.

FIG. 1.—Irrigation districts in the United States as of December 31, 1921, showing all active existing districts. Inactive districts, even though legally alive, are not included.

TABLE 1.—*Irrigation districts formed in the United States to December 31, 1921, by States and by years.*

Year.	California.	Washington.	Kansas.	Nevada.	Oregon.	Idaho.	Nebraska.	Colorado.	Texas.	Wyoming.	Montana.	New Mexico.	Utah.	Arizona.	Oklahoma.	South Dakota.	North Dakota.	Total.
1887	[1] 4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	4
1888	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	7
1889	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	6
1890	11	[1] 4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	15
1891	13	2	(1)	(1)	....	....	....	....	....	....	....	....	....	....	....	....	....	15
1892	3	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	4
1893	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	4
1894	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
1895	1	....	....	....	(1)	(1)	[1] 9	....	....	....	....	....	....	....	....	....	....	10
1896	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....	....	....	3
1897	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	2
1898	....	....	....	....	....	....	4	....	....	....	....	....	....	....	....	....	....	4
1899	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
1900	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1
1901	....	....	....	....	....	1	1	[1] 1	....	....	....	....	....	....	....	....	....	3
1902	....	....	....	....	....	2	....	1	....	....	....	....	....	....	....	....	....	3
1903	....	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....	....	3
1904	....	....	....	....	1	3	1	4	....	....	....	....	....	....	....	....	....	9
1905	....	....	....	....	2	1	1	2	(1)	....	....	....	....	....	....	....	....	6
1906	....	....	....	....	1	2	2	3	....	....	....	....	....	....	....	....	....	8
1907	....	....	....	....	....	1	....	3	....	(1)	[1] 2	....	....	....	....	....	....	6
1908	....	....	....	....	....	1	....	5	....	1	....	....	....	....	....	....	....	7
1909	2	....	....	....	....	4	1	19	....	2	6	[1] 1	[1] 6	....	....	....	....	41
1910	....	....	....	....	2	3	....	18	....	1	2	1	2	....	....	....	....	29
1911	2	2	....	....	1	1	1	9	1	3	1	1	1	....	....	....	....	23
1912	....	4	....	....	4	8	4	5	....	....	....	1	1	[1] 2	....	....	....	29
1913	2	2	....	....	2	4	2	2	2	....	3	....	....	1	....	....	....	20
1914	1	6	....	1	....	2	....	....	3	....	1	....	....	....	....	....	....	14
1915	5	7	....	....	1	5	1	....	1	....	....	....	....	....	(1)	....	....	20
1916	8	9	....	....	7	2	....	....	1	....	2	....	....	....	....	....	....	29
1917	7	14	....	....	10	4	....	....	3	....	1	1	3	....	1	(1)	(1)	44
1918	8	8	....	1	8	4	3	....	1	....	2	1	....	2	....	....	1	39
1919	11	11	....	1	14	4	2	....	3	....	13	....	....	2	....	....	....	61
1920	18	15	....	1	12	13	2	....	4	1	23	....	3	2	....	....	1	95
1921	14	3	....	....	1	3	....	....	1	2	5	....	5	....	....	....	....	34
Total	127	88	....	4	66	69	39	75	20	10	61	6	21	9	1	....	2	598

[1] Irrigation district act passed.

PRESENT STATUS OF IRRIGATION DISTRICTS.

A number of irrigation districts had been formed prior to 1910, there being a period of marked development in California from 1887 to 1893 and to a lesser extent at a later date in a few other States. About 1910 interest began to revive in California, in which no district had been formed since 1895, and also in Washington, and developed shortly afterwards in Arizona and Texas. Progress was slow for a few years, however, due to the unwillingness of eastern and middle western investors to consider irrigation bonds and to the necessity of disposing of bonds almost entirely to local people familiar with the merits of the enterprises issuing them. In the meantime such additional safeguards had been thrown about the formation and bonding of districts in California that gradually a fairly dependable market began to be built up there, and by 1917 and 1918 irrigation districts in a number of States began to find it possible to market their bonds. Bonds of districts which already have established values behind them are now disposed of much more readily than those issued to provide for future development, the effect of which is that present-day development by irrigation districts is generally conservative.

The increasing favor in which irrigation bonds have recently been held has been accompanied by a corresponding increase in the number of districts formed throughout the West. In the two years 1919 and 1920 there were created 156 irrigation districts, or more than one-fourth of the total number formed to date. This activity has taken place mainly in California, Washington, Oregon, Idaho, and Montana.

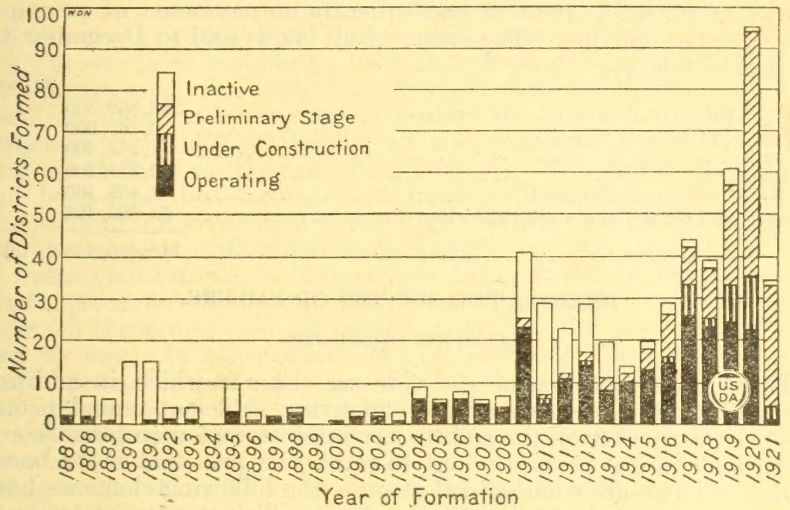

FIG. 2.—Status of irrigation districts in the United States, December 31, 1921, by years in which formed. The symbols are not superimposed, the height of each column representing the total number of districts formed that year.

The year 1921 showed a very marked decrease in the number of new districts organized, but on the other hand witnessed the sale of more bonds than any previous year.

The accompanying chart (Fig. 2) shows the status on December 31, 1921, of all irrigation districts organized to that date. Table 2 summarizes areas included in all irrigation districts in the several States.

TABLE 2.—*Areas included within irrigation districts organized to December 31, 1921, and areas irrigated, in acres.*

State.	Status of districts.				All districts.	Approximate areas irrigated by districts, 1921.[1]
	Operating.	Under construction.	Preliminary stage.	Inactive.		
Arizona	18,040	.....	177,575	91,000	286,615	2,300
California	1,931,696	250,060	1,699,073	1,675,451	5,556,280	1,263,500
Colorado	657,317	.....	.....	1,338,038	1,995,355	345,200
Idaho	552,902	112,590	299,660	119,507	1,084,659	421,300
Kansas	.....	.....	.....	.....	.....	.....
Montana	143,715	20,548	591,360	70,486	826,109	85,700
Nebraska	229,369	78,500	3,314	120,900	432,083	207,400
Nevada	350,000	.....	32,500	.....	382,500	70,000
New Mexico	136,602	.....	.....	26,400	163,002	17,100
North Dakota	27,501	.....	.....	.....	27,501	.....
Oklahoma	.....	.....	2,500	.....	2,500	.....
Oregon	337,266	54,752	1,031,556	585,320	2,008,894	124,800
South Dakota	.....	.....	.....	.....	.....	.....
Texas	437,871	157,000	4,853	109,179	708,903	155,700
Utah	46,886	.....	229,601	88,673	365,160	31,800
Washington	253,335	37,447	1,204,190	251,422	1,746,394	109,600
Wyoming	43,250	55,000	108,000	100,790	307,040	23,000
Total	5,165,750	765,897	5,384,182	4,577,166	15,892,995	2,857,400

[1] Exclusive of irrigated areas within districts which had not taken over the management of the irrigation systems.

Integrity of irrigation district bonds.—The effect of the two eras of district promotion for speculative purposes has sometimes been the placing of greater emphasis upon defaults than a study of the whole history of irrigation district bonds shows to be justified. As a matter of fact the principal and interest of 71 per cent of all bonds sold by irrigation districts in the United States to December 31, 1921, have been paid when due although a large percentage of these has been issued in recent years and consequently no payments of principal have yet become due. The status of all bonds sold to December 31, 1921 is as follows:

		Per cent.
Held illegal	$3,369,350	3
In litigation	2,767,000	2
Defaulted	1,383,300	1
Compromised	19,371,200	16
Expected to be compromised	7,852,100	7
Interest and principal always paid when due	83,693,493	71
Total bonds sold	118,436,443	100

REASONS FOR SUCCESS OR FAILURE.

ELEMENTS OF SUCCESS.

The successful irrigation districts are those in which, in addition to securing and distributing water effectively, sufficient annual income has been derived from the soil to pay interest and maintenance and operation charges promptly and to retire the principal of the bonds as due. To assure such annual income, the following elements have proved necessary: (*a*) Productive land; (*b*) sufficient water; (*c*) reasonable capitalization; and (*d*) adequate land settlement.

Irrigation districts which have been fortunate in the above qualifications have almost invariably succeeded. Some such districts have suffered reverses, such as damage to the irrigation system, unduly severe marketing conditions, etc.; but few cases have occurred where sound district enterprises have been unable to withstand temporary misfortune.

CAUSES OF FAILURE.

Past causes of failure of irrigation districts may be reduced to the following general classes:

Opposition of principal financial interests.—Some of the earliest districts met disaster or at least years of obstruction because of the inclusion of too much land belonging to persons opposed to district organization. The principal weapon of these landowners—attack upon the constitutionality of the law—is no longer available, but there are other ways in which they may prove obstructive. However, due to the present sounder footing upon which the district stands, cases have occurred in recent years in which such opposition has been successfully disregarded. This cause of failure, therefore, while still to be reckoned with, is not so pronounced as it was some years ago.

Inclusion of unproductive lands.—Inclusion of large areas of land physically incapable of bearing their share of the burden of taxation has resulted in trouble to some districts. It is the area that is actually irrigable and capable of producing satisfactory crops that in the last analysis is responsible for the district debts. So-called

"shoestring" and "spotted" development, resulting in disproportionate maintenance and operating expenses, has likewise been unfavorable to success.

Before public lands were made liable to inclusion within irrigation districts, some districts which had placed too great dependence upon the voluntary incorporation of such areas found themselves embarrassed by the lack of revenue therefrom.

Inadequacy of water supply.—Inclusion of more land than could be adequately irrigated with the available water supply has been a fruitful source of trouble to districts. Remedying such a situation necessarily involves a higher acreage cost than anticipated, either by securing additional supplies of water for the entire area or by eliminating portions of the district and concentrating all the water and all the cost on the remaining portions. In some cases this has not been fatal, but the wide margin allowed in other cases between the early productive value of the land and the cost of the irrigation system has been sufficient to cause failure.

Overcapitalization.—A frequent condition found in irrigation districts promoted for profit has been the unduly large difference between the actual cost of construction and the price the settlers had to pay. In other words, a system costing, say, $30 per acre has sometimes been sold to or built for the settlers for $45 per acre, the difference of $15 per acre, or one-third of the bond issue, constituting promotion profits. Legislative attempts to prevent overcapitalization by providing that bonds should not be disposed of for less than 90 or 95 or even par did not hinder promoters from placing excessive valuations upon the works and trading them for district bonds at what purported to be a legal figure. The difficulty with such an overcapitalized district was that the additional charge of $15 per acre sometimes represented the difference between success and failure.

Faulty engineering.—Unwise location of irrigation works, faulty design and construction, poor choice of materials, etc., have been responsible for some of the troubles of irrigation districts, but have been far less prominent as causes of failure than have most of the other causes enumerated. The science of irrigation engineering has developed more rapidly than have the solutions of some of the other problems that districts are confronted with.

Insufficient settlement of land.—Settlement of sufficient land to provide revenue for district requirements is vital to the success of any irrigation district. Irrigation enterprises of all types are dependent for eventual success upon the same thing; but the method of financing an irrigation district through the disposal of bonds makes the early settlement of land especially important, for the district is dependent upon its own efforts for money to operate the system and must in addition provide for interest payments on bonds. Capitalization of interest on the bond issue eases but does not wholly relieve the situation. It is very essential that the district become self-supporting quickly. Coupled with such necessity is the need for having the right kind of settlers from the standpoints of industry, adaptability, and some degree of financial means. Lack of adequate land settlement or capable settlers has been a source of trouble in a number of districts, has prevented the financing of others, and has proved to be one of the greatest obstacles in the way of success.

There is a possible field here for public aid in land settlement, which is still somewhat in the experimental stage in the few States that have taken it up.

Under this heading may be classed also those districts for which there was no economic justification and which failed to attract settlers in sufficient numbers to be of substantial assistance.

Past conditions permitting unfeasible undertakings.—That irrigation districts have been allowed to be formed and financed under conditions conducive to failure has been due in past years largely to overoptimism of landowners, manipulations of promoters, connivance of certain bond houses, inexperience in district possibilities and limitations, and absence of official restraint. The fact that bond investors did not discriminate sufficiently between speculative and nonspeculative bonds made possible the flotation of issues with little security beyond a purely prospective value. In certain speculative districts, with one or more of the necessary elements of land productivity, water, reasonable capitalization, and rapid colonization lacking, the inability to meet payments led to demoralization and failure to create the required security. Inasmuch as bonds of those districts had been sold to the ultimate investors on practically the same basis as bonds of districts in already proven communities, instead of being sold on the basis of a speculative investment, the failures reacted very unfavorably upon the sale of nonspeculative bonds as well.

At the present time what the district can and can not accomplish is better known than it was. The temper of the bond market during the past 10 years has not been such as to sanction the financing of questionable schemes on any great scale, and in any event the effects of State supervision have been beneficial in making known the opinions of qualified State officials as to feasibility and in preventing the formation of certain districts considered to be unfeasible.

WHERE THE DISTRICT HAS SUCCEEDED.

Some district enterprises in which the security for the bonded indebtedness remained to be created have attained success because they have combined the features necessary to rapid development of the land and production of income. But the proportion of districts of this type that have proved successful from all standpoints is small in comparison with the proportion in which at least a fair amount of the security existed at the time of organization. Supplemental development of itself is not conclusive upon adequacy of the security, nor does new construction necessarily imply a speculative enterprise; yet the present status of districts formed, respectively, for supplemental and for new development, as shown in Table 3, page 10, is indicative of the fact that districts of the supplemental class have more generally attained their ends. Furthermore, though there are shining examples to the contrary, the class of districts formed for extensions, betterments, and other supplemental purposes has provided many more cases of prompt payment of obligations than has the group organized for new construction. Supplemental development implies some prior development through which values have been created and irrigation works constructed and put into operation, together with a certain amount of income already accruing from the benefits of irrigation. As the irrigation district is dependent upon revenue, it has followed that conditions making possible immediate and adequate revenue

have gone far toward insuring financial success. Supplemental development has more often embraced such conditions.

As a general rule, therefore, the successful districts have been those formed for purchase and operation by the landowners of constructed systems which were "going concerns"; for extension of existing systems to cover adjacent unirrigated lands; for improvement of existing systems; for providing needed additional amounts of water; for contracting with the United States on Federal reclamation projects for payment of construction and operation costs and for future operation; and for building new irrigation systems in sections already productive under dry-farming methods, or where development has followed rapidly. In any event, the irrigation districts that have succeeded have embraced the essential elements of productive land, sufficient water, reasonable capitalization, and adequate land settlement.

PURPOSE OF FORMATION.

The original purpose of the irrigation district was the construction of irrigation works. Although the Wright Act gave the districts the alternative power of purchasing irrigation systems, nevertheless it was the need for new development that resulted in the formation of districts during the first few years predominantly for the construction of new works. In fact, 41 districts, or 75 per cent, of the 55 districts formed in California and Washington during the first seven years were intended for such purpose.

As time went on the district organization was employed for other purposes, such as the acquisition of existing irrigation works by landowners who were dissatisfied with the managment or who thought that they might operate the system more economically themselves; or the extension of existing systems to include adjacent unirrigated areas; or the improvement of existing systems; or the development of additional supplies of water needed for late summer irrigation by communities already served with a partial supply, a condition which often arises in sections undergoing transition to more intensive development. All of these purposes presuppose a certain amount of development prior to the district formation, and bonds issued by such districts usually have had ample security behind them to insure regular payment of interest and liquidation of the principal at maturity.

Of course such classification of irrigation districts is subject to exceptions, for districts intended for absolutely new construction have often been formed in sections where high land values had already been established independently of irrigation and where the districts were not essential to the success of the communities, or where circumstances were otherwise favorable to speedy success. On the other hand, some districts organized to take over existing works have faced uphill tasks because of the insufficient settlement of land, shortage of water, inclusion of too much additional unirrigated land, or other causes. The success of a district has in most cases been dependent upon the relation of its development to the times when its obligations fell due. The advantage, therefore, has been in the majority of cases with districts formed for supplemental purposes.

Table 3 gives the number and present status of all irrigation districts formed to date in each State for the two main classes of develop-

ment, and the accompanying chart (Fig. 3) gives the respective rates of formation of these classes to the present time. Attention is called particularly to the percentages of totals given in the last line

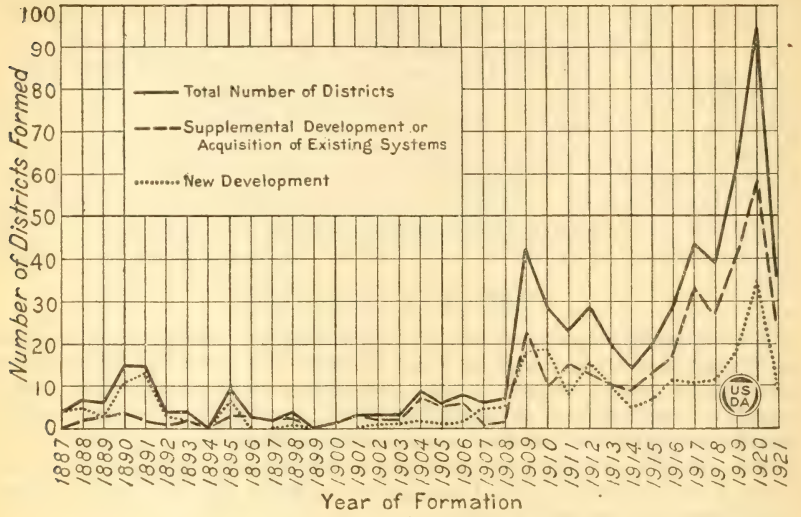

FIG. 3.—Rate of formation of irrigation districts in the United States according to the type of proposed development. Points on each year-line represent the number of districts of each class and the total formed that year.

of the table, which indicate a much more favorable situation generally in the class of districts formed for supplemental purposes than in the other class.

TABLE 3.—*Status December 31, 1921, of irrigation districts in the several States classified according to purpose of formation.*

State.	Purpose of formation.										All districts.				
	Entirely new development.					Supplemental development or acquisition existing works.									
	Operating.	Under construction.	Preliminary stage.	Inactive.	Total.	Operating.	Under construction.	Preliminary stage.	Inactive.	Total.	Operating.	Under construction.	Preliminary stage.	Inactive.	Total.
Arizona	1	.....	4	3	8	1	.....	.....	.....	1	2	.....	4	3	9
California	8	5	14	34	61	29	6	21	10	66	37	11	35	44	127
Colorado	6	.....	.....	33	39	20	.....	.....	16	36	26	.....	.....	49	75
Idaho	6	1	9	6	22	31	4	10	2	47	37	5	19	8	69
Kansas	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Montana	2	.....	19	5	26	22	2	8	3	35	24	2	27	8	61
Nebraska	4	.....	.....	4	8	21	3	2	5	31	25	3	2	9	39
Nevada	.....	.....	.....	.....	.....	2	.....	2	.....	4	2	.....	2	.....	4
New Mexico	.....	.....	.....	2	2	4	.....	.....	.....	4	4	.....	.....	2	6
North Dakota	.....	.....	.....	.....	.....	2	.....	.....	.....	2	2	.....	.....	.....	2
Oklahoma	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	.....	1	.....	1
Oregon	8	4	15	6	33	14	1	16	2	33	22	5	31	8	66
South Dakota	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Texas	.....	2	.....	1	3	13	1	1	2	17	13	3	1	3	20
Utah	1	.....	.....	4	5	6	.....	7	3	16	7	.....	7	7	21
Washington	9	1	18	9	37	31	6	9	5	51	40	7	27	14	88
Wyoming	1	.....	.....	3	4	2	1	3	.....	6	3	1	3	3	10
Total	46	13	79	110	248	198	24	80	48	350	244	37	159	158	598
Per cent of total	18.5	5.2	31.9	44.4	100	56.5	6.9	22.9	13.7	100	40.8	6.2	26.6	26.4	100

THE ELECTORATE.

The qualifications required of voters at irrigation district elections vary widely in the several States. The California rule has always been that such qualifications shall be those prescribed by the general election laws of the State. Early experience in California indicated, however, that great harm might be done through the voting of bonds by persons who might be called upon to shoulder none of the burden of paying off the indebtedness—in other words, by electors who owned no land—with the result that in the revision of the Wright Act in 1897 provision was made for presentation of a petition signed by a majority of the landowners, representing a majority in value of the lands, before the directors could call a bond election. The petition is no longer required in California, although a majority instead of a two-thirds vote is sufficient to authorize bonds if such petition has been presented, and the directors must call an election if petitioned. Furthermore, it is now optional that the petition be signed by 500 persons, either electors or title holders, representing at least 20 per cent of the value of the lands; for in very large and populous districts it was found that the majority provision involved so much time and expense that the business of the district was seriously hampered, and that in any event the very nature of such districts required less stringent regulation of bond issues. The Kansas law requires a petition by three-fifths of the resident landowners before a bond election may be called. The present Idaho law imposes the qualifications of the general election laws and residence in the district upon district electors, with an additional landholding qualification when voting on the question of issuing bonds or otherwise incurring indebtedness.

The other 14 irrigation district States impose property qualifications in one form or another upon all district electors. These various requirements, in addition to ownership or possession of land or of some stated acreage of land within the district, in most cases include residence in the district or at least in the State, and in several instances also include general election qualifications or citizenship. Corporations, executors, administrators, and guardians are sometimes allowed to vote. Four States impose no residence qualification at all. Voting according to acreage is allowed in Colorado, Montana, and Wyoming, and according to acre-feet of water allotted to the land of the elector in Utah. Oregon formerly permitted a vote for each acre of land, but in 1917 limited each person to one vote. Colorado's experience was just the reverse, the new law of 1921 authorizing voting according to acreage. For two years Nevada had in effect a system of voting according to dollars of assessment of benefit, but changed to one vote per elector in 1919.

Almost all of the States, therefore, limit the right to create indebtedness to those persons whose lands are to become responsible for it, but only a few States recognize the vital interest of landowners living out of the State. Some difference of opinion exists as to the wisdom of allowing voting according to acreage owned. On the one side it is argued that an irrigation district is a business corporation rather than a governing municipality and that its affairs should accordingly be conducted along parallel lines, recognizing the right of the majority in interest to control. On the other hand, proponents of the plan of limiting individuals to one vote contend that the small landowners

are as vitally interested in the district as are the large holders, and that the plan of giving a vote to each acre puts control of district affairs in the hands of a few large landowners.

The really important feature at the present time, however, is the very general recognition given to the interest of the landowner in the creation of district indebtedness. The irrigation district has but one end in view—the development of a community through the irrigation of its agricultural land. All persons in the community are interested in its development, but those persons whose lands are to be made to pay for the entire irrigation development are necessarily most deeply concerned.

MANAGEMENT.

The management of an irrigation district is vested in a board of directors or commissioners, who must usually be landowners and electors in the district. The directors are elected in whole or in part every year or two years, and, except for the collection and custody of funds by county officials or by elected district officials, are solely responsible for the conduct of district affairs. They may appoint and discharge at will all officers and employees of the district except those whose election is provided for by statute. In California, where the handling of funds is in the hands of the district, the assessor, collector, and treasurer are elected officials. In Idaho, on the contrary, the assessor, whose duties are performed by the secretary, and the treasurer are appointed by the directors. Again in Texas the assessor-collector may be appointed by the directors or elected at their option. In all of the States directors have the responsibility either of levying assessments or of initiating proceedings therefor, as well as of authorizing expenditures.

The number of directors depends in some measure upon the size of the district. Some States authorize only one officer—usually three—but others allow some latitude either to the original petitioners or to the electors after organization in determining whether the number of directors shall be greater, the highest number allowed in any State being nine. Owing to the wide range in size of irrigation districts (the smallest in the United States containing 42 acres and the largest 603,840), it is realized that some latitude in the size of the managing board is desirable, for a large board of directors makes the management of a very small district unwieldly and cumbersome, whereas a small board may not afford adequate representation in a large district of divergent needs and conditions. The usual practice is to lay out the district into divisions as nearly equal in area as practicable and to choose one director from each division.

The powers of the board of directors are usually set forth at great length in the statutes. In the execution of their policies the directors are given extensive authority to appoint employees on the scale desired. Owing to the nature of an irrigation district, which requires construction of works at certain times and maintenance and operation of the system at all times, the services of an engineer are always needed, highly trained services a great deal of the time, and practical experience always. So it has come about that the district engineer is frequently the principal executive officer as well. Some large districts have found it advantageous to employ a general manager of executive ability, and usually of engineering training and experience, who is placed in charge of all phases of the district's oper-

ation. The Texas statute specifically encourages the appointment of a manager.

The irrigation district has frequently been criticized on the ground that it places the disposal of great sums of money in the hands of persons whose experience has generally been limited to the handling of amounts applicable to farming operations. Undoubtedly it is true that very few districts are able to secure men as directors who have handled millions of dollars. It is also true that irrigation is a business, and that it is to the interest of every landowner to have the business conducted as economically as possible. In actual practice it has frequently occurred that the lack of experience of directors has proved costly in their financial dealings and in the unwise expenditure of funds. The selection of directors from political considerations has also been decried. But these problems are incident to the conduct of any self-governing institution, and so long as the irrigation district remains self-governing its efficiency will depend upon the choice of directors who are able to combine business ability with public spirit and who are broad-gauged enough to leave the administration of details to employees more capable than themselves of performing such duties.

The actual character of the management varies greatly in different districts, and many examples can be cited of careful and altogether high-class management. In probably the greater number of operating districts the character of the management is but a reflection of the progressive spirit of the farmers composing the electorate. After discounting the activities of the ever-prevalent "chronic kickers," the farmers usually get, sooner or later, the kind of management they really want.

FINANCE.

The irrigation district secures revenue for the construction or acquisition of irrigation works, their annual maintenance and operation, and for all general purposes primarily by means of assessments levied upon the land. Each assessment becomes a lien upon the land when levied, and its collection may be enforced by delinquent tax sale or in some cases by a suit at law. Other and secondary methods of raising revenue are through tolls charged for the actual use of water, through the sale or rental of water to lands outside the district, and the sale of electric power generated by the district.

In order to spread over a series of years the burden of paying for the irrigation works, the district may borrow money through the issuance of bonds, or may contract with the United States for the construction or acquisition of an irrigation system. The interest and principal of the bonds and the installments due the United States are payable from the proceeds of annual assessments. Current expenses are taken care of, pending the collection of assessments, by the issuance of warrants and in some States by negotiable notes.

Financial officers.—Although the irrigation district is responsible for its own financial condition, the services of county officials are utilized to greater or less extent in most of the States for levying and collecting assessments and disbursing district funds. California, Idaho, and Texas, however, provide complete district machinery for handling financial matters and make the district entirely independent of the county so long as the district continues to levy assessments to

pay its debts, failing which the county is obliged to step in. The Kansas statute provides for a levy by the district, but is silent as to collections. In Arizona, Colorado, New Mexico, and Utah the district directors determine the amount of money necessary to be raised, but the county commissioners levy the assessment after the county assessor has made up the roll, and the county treasurer collects the taxes at the same time and in the same manner as collections of general taxes are made. The county treasurer of the county in which the office of the district is located is ex officio district treasurer. In the other States these fiscal duties are divided, the usual procedure being that the district levies the assessment and certifies the assessment roll to the county assessor or county clerk, as the case may be, for addition to the county roll, the county treasurer making collections in the usual way and transmitting the receipts to the district treasurer or ex officio treasurer. In several of these States the county treasurer of the county in which the district was orginally organized is charged with the duty of paying the interest and principal of bonds, while collections on account of assessments for general purposes are turned over to the district treasurer to be disbursed by him.

There is no fundamental distinction, therefore, between district and county handling of funds in so far as the usual responsibility of the district directors is concerned. Whether the directors actually levy the assessment or not, it is nevertheless their duty at least to initiate proceedings looking to procuring revenue through the proper channels and to authorize expenditures. The only difference is that some States have put the existing county financial machinery at the disposal of the irrigation district.

Accounting.—For the purpose of accounting, each statute prescribes certain funds, the most usual series consisting of the bond fund, including money received from the collection of assessments for payment of interest and principal of bonds; the construction fund, money received from the sale of bonds or from collection of construction assessments, to be used for construction of works; the general fund, revenue for the payment of current expenses; and the United States contract fund, money received for making payments due under Federal contracts. Several States prescribe a single fund called the bond and United States contract fund for money received on account of payments due on bonds or on Federal contracts. Other names are sometimes given to funds for substantially the above purposes, and additional funds are often provided. The reason for having definite funds is to insure the use of money for the purpose for which it was obtained. Statutory provision sometimes exists for transferring money from one fund to another.

ASSESSMENTS.

The nature of the irrigation district tax—that is, whether it is a general tax or a special assessment—has been the subject of some controversy and of several conflicting decisions by the courts. This matter becomes of very live importance when bondholders' remedies are involved, for if the district tax is in the nature of a local assessment, land on which an assessment has been paid is thereby relieved of the lien for that assessment and may not be reassessed for more than its proportionate share because of the failure of other land-

owners to pay. Where this view prevails, bondholders can not look to the liability of the district as a whole, but in case of default are limited to the purchase of tax-sale certificates on delinquent land. On the other hand, if the tax is considered a general tax and the district as a whole held liable, then paying lands may be assessed over and over again until the district obligations are discharged. The one view, therefore, is favorable to the landowners and the other to the bondholders. Several of the statutes have made provision for releasing individual tracts, either completely or conditionally, from the lien for construction assessments upon paying in advance their proportionate share of the total cost, thus definitely restricting the balance of the indebtedness to the remainder of the land. The remedies of bondholders are strengthened in several States, however, the Oregon law providing, for example, that in case of default the bondholders, or the United States in case of Federal contract, may take possession of the irrigation works and operate them during the default, while Washington under similar circumstances permits the creditor to take possession and use the property until the lien can be enforced in a civil action, as in case of foreclosure of a mortgage.

Assessments are levied annually at the times prescribed by the respective statutes, in order to raise money for paying the interest and principal of bonds, or to provide a sinking fund for retirement of the bonds when due; also for payments due the United States, other obligations of the district, rentals due, and for maintenance and operation and all general purposes. The amount that may be raised annually for maintenance and general expenses is sometimes limited by statute. Special assessments must usually be authorized by vote of the electors. Some of the statutes provide for levying a greater amount than needed—usually 15 per cent—to cover anticipated delinquencies.

Several States authorize the receipt of bonds or coupons in satisfaction of the bond fund levy for years in which such obligations fall due, and in some cases the receipt of warrants in payment of general fund levies.

A usual statutory provision is that the assessment lien for the payment of bonds or for payments due on contract with the United States shall be a preferred lien to that for bonds subsequently issued.

METHODS OF ASSESSMENT.

While all irrigable lands within an irrigation district are liable to assessment, and in some cases nonirrigable lands as well, there are several methods of determining the amounts to be assessed against the respective tracts. One method is customarily in use in each State, though it is sometimes provided that districts contracting with the United States may levy assessments pursuant to the terms of such contract.

Ad valorem method.—The original Wright Act of California provided that all real property in the district, including improvements, should be assessed for irrigation district purposes at its full cash value. In 1909, however, the legislature exempted improvements from taxation in all districts thereafter organized and provided that existing districts might come within the new provision by vote of a majority of the resident title holders. Most of the operating districts in which assessments were being levied proceeded to take advantage

of this plan. Nebraska and Oklahoma follow the present California plan, while Texas provides for taxation of all property in the district—real, personal, and mixed—and Kansas all real estate dependent upon the works for irrigation. Assessments may be apportioned in accordance with the benefits in California in case of payments to be made to the United States, and in Texas in case of districts electing to become "conservation and reclamation districts."

Some of the California and Nebraska districts have made an approach to assessment according to the full cash value of the land, but the valuations arrived at are in most cases not proportionate to the market values. That is, although higher valuations are sometimes placed upon lands close to cities and towns and along important highways, nevertheless nominal valuations are customarily assigned to lands lying above the ditch system or impregnated with alkali, thus following to this extent the benefit method of appraisement. Many districts in these two States adopt only two or three classifications, and some value all farm lands alike.

Uniform rate per acre.—In Oregon, Colorado, Montana, Arizona, and New Mexico all lands within an irrigation district are assessed at the same rate per acre. In Oregon, however, reclamation of the lands may be by units and the assessments apportioned accordingly, provided the State engineer approves such plan. This has not yet been put into effect in any Oregon district. Another exception to the Oregon rule, and one which has been satisfactorily put into operation, permits assessments, except for operation, maintenance, and drainage, against any tract which has an appurtenant water right not yet acquired by the district to be in the same proportion to a full assessment as the additional water right to be supplied by the district bears to a full water right. In Montana, furthermore, in case of pumping to different elevations, maintenance and operation assessments may now be levied at a different rate for each elevation.

According to benefits.—Assessments are apportioned according to the benefits received in Idaho, Washington, North Dakota, South Dakota, Nevada, and Wyoming, and in California and Texas under the circumstances above referred to. The Idaho plan involves a single apportionment of benefits after a bond issue has been authorized, which apportionment is subject to confirmation by the court and which as finally confirmed is the basis of all future assessments to pay the principal and interest of the bonds or assessments levied in lieu of such bonds. The Washington apportionment, on the other hand, is made annually. The Nevada plan follows that of Idaho, but allows a reapportionment in particular cases in later years provided the security for the bond issue is not thereby decreased.

The application of the benefit principle in the many operating irrigation districts in Idaho and Washington has been far from uniform. In some districts it has been assumed that all irrigable land is equally benefited and that nonirrigable land receives no benefit, with the result that all of the cost has been assessed at a uniform rate per acre against the irrigable land. In other districts it has been decided that all district land, whether irrigable or lying above the canal system, is benefited either directly or because of the enhanced value of the community as a whole, in which cases the construction cost has been apportioned against irrigable and unirrigable lands in the ratio of, say, 10 to 1. Sometimes, but not often, several grades of

irrigable or of nonirrigable land have been established and different benefits assigned. In several cases where districts took over existing systems embracing tracts upon which only partial water-right payments have been made, the unpaid amounts were added to a flat rate per acre in determining the amount of benefits to assess against such tracts. In at least one instance of drainage construction by an irrigation district two classes of benefits were assessed, one amount against lands directly benefited and the other against lands indirectly benefited. Adjustments for preexisting partial water rights and seepage conditions have also been made by this method.

According to water allotment.—In Utah, prior to district formation, a determination is made by the State engineer of the maximum amounts of water which may be beneficially used upon each 40-acre tract, or smaller tracts if in separate ownership, in the proposed district, which allotment, as finally revised after organization when the amount of water available has been determined, is the basis for all assessments and tolls. In actually making such allotment existing water rights are listed, soil and subsoil classified, depth to ground water measured, and the water deficiency ascertained.

Comparison of methods of assessment.—A certain amount of flexibility in determining the proper amounts to be assessed against district lands is obtainable by either the ad valorem or the benefit method. Theoretically the ad valorem method might seem to require a rigid application, yet in actual practice the district assessors have frequently departed widely from a strict interpretation of the law, even to the extent in some cases of valuing all farm lands in the district year after year at the same rate per acre. The ad valorem principle does not readily lend itself, however, even under a liberal interpretation, to the organization into an irrigation district of a community in which varying degrees and values of water rights already exist, unless the district is prepared to purchase such rights, nor to a community composed of distinct units requiring radically different construction costs. The method of assessing according to benefits is designed to take care of varying local needs and conditions. Greater adaptability in determining benefits is of course possible where the apportionment is made annually, or where a reapportionment is permitted in particular cases in subsequent years, than where the allotment of benefits is made only once for all time.

On the other hand, the two opposite extreme views on assessment are represented by the methods of assessing at the same rate per acre and according to acre-feet of water allotted, neither of which would seem to allow of deviation from the fixed rule. The one view is that the irrigation district is a unit in its community of interest, involving equal benefits to all lands, with the result that each acre should bear a share of the burden equal to that of every other acre. The other idea is that the quantity of water received from the district is the measure of interest each tract has in the district, and that a tract receiving 4 acre-feet per acre is benefited twice as much as one entitled to 2 acre-feet per acre. Both Oregon and Montana, as above stated, have recently permitted modifications of the uniform rate plan. The Utah plan of assessing according to water allotments has been in force since 1917 only and has not yet been sufficiently tried out in extreme cases to warrant conclusions as to its operation.

Operation costs—Tolls.—The basis for securing revenue for operating purposes is frequently different from that upon which construction charges are apportioned. While all irrigable (and sometimes nonirrigable) lands in an irrigation district are made liable for the cost of building or acquiring the irrigation system, nevertheless a sentiment sometimes prevails that lands not using water should not be required to bear so large a proportion of the cost of maintaining and operating the system as lands to which water is actually delivered. In some States this distinction may be made in the annual assessment for general expenses, and in others it is made possible only through the imposition of tolls.

The ad valorem method in Texas does not apply to assessments for maintenance and operation purposes. For such purposes, one-third to two-thirds of the estimated expense for each year is charged at a uniform rate per acre to all land capable of being irrigated and the balance to all persons actually applying for water. In the exercise of statutory authority, some of the Texas districts take promissory notes in advance from applicants for water and hypothecate these notes in order to secure money for operating expenses.

Where assessments in Idaho districts are levied for maintenance and operation purposes, they are required to be in proportion to the benefits received from the maintenance and operation of the district works rather than proportionate to the construction cost. This makes it possible to charge general expenses in whole or in part to lands using water in any year. Idaho has a further provision that in cases where works were constructed by the United States under the reclamation act, operation and maintenance assessments shall be levied according to the number of acre-feet delivered during the preceding season, with a minimum charge upon each irrigable acre for not less than one acre-foot.

New Mexico provides that in districts formed to contract with the United States, the portion of operation and maintenance costs to be collected by tax shall be not less than one-fourth nor more than two-thirds of the total.

Most of the States give district directors the discretion of fixing rates of toll for water in order to defray the expenses of organization, the operation, repair, and improvement of canals constructed and in use, salaries, and other current expenses, or of levying assessments for such purposes, or of employing both methods. Tolls may sometimes be made payable in advance of water delivery, but this is seldom done (except through the hypothecation of notes in Texas districts) owing to the fact that money for the payment of tolls is often available only upon the sale of crops which that particular water was used in producing. In one Idaho district the quantity of water used during the season is the basis of charge for water master's and ditch riders' salaries and for repairing an occasional break on the canal system, and the area of land irrigable is the basis of assessments for maintenance and all general expenses. Three of the older California districts which have now no bonded indebtedness derive all or nearly all of their income from tolls and several others use both tolls and assessments.

BONDS.

The outstanding feature that distinguished the early Wright Act districts from those authorized by the early Utah law was the power

to issue bonds. This feature probably commands more widespread interest in irrigation district activities than does any other phase of its operations. That the bonding privilege has been the outstanding inducement toward the formation of districts is indicated by the fact that 83 per cent of all districts now in operation or undergoing construction have voted bonds, and that 79 per cent of all such districts have sold all or portions of their bond issues.

The bond of an irrigation district contains a promise to pay a definite sum at a definite date, with attached interest coupons payable annually or semiannually, the security lying in the district's power and duty to levy annual assessments upon all of the lands benefited in order to secure funds for paying the principal and interest as due. In case of neglect or refusal of district or county officials to levy such assessment, bondholders may compel such levy by mandamus proceedings.

Bonds must be authorized by vote of the district electors, prior to issue, in all States except Montana and Wyoming. In Montana, however, a petition must first be filed with the district commissioners by a majority in number and acreage of the title holders. In Wyoming, after the assessment for construction has been confirmed by the court, the district commissioners without further authorization may issue bonds not exceeding the amount of the assessment. An investigation of the feasibility of proposed plans is a prerequisite in some States.

Validation.—So vital is the question of the legality of district bonds that the California Legislature early provided a means whereby the directors of a district could bring a special action in court to determine and confirm the validity of proceedings leading up to and including the bond issue. This feature has been adopted by the other States with the sole exception of Kansas, some of which States make the bringing of such action mandatory. The strength of this measure lies in its assurance of determining the legality of bonds prior to their sale and before such legality can be called into question against the interest of purchasers. The various statutes also provide that proceedings in connection with assessments, contracts with the United States, and other acts may be tested in the same way.

Certain bond issues in large amounts sold during the first six years of irrigation district operations in California, and in 1911 in Colorado, were subsequently declared null and void by the courts. With the ample means now provided for assuring validity, there would seem to be little need of a repetition of this experience.

Interest rates—Capitalization of interest.—Most of the statutes prescribe that irrigation district bonds shall bear interest at a rate not exceeding 6 per cent per annum; three, however, provide that the interest rate shall be 6 per cent, and several laws fix the limit at 7 per cent. Bonds issued in behalf of local improvement districts are usually authorized to bear a higher rate of interest than the usual district bonds. In most States interest must be paid semiannually, usually on January 1 and July 1.

In order to give irrigation districts an opportunity to get on a paying basis before demands for interest shall fall due, it is now provided in the majority of the States that the first one to four years' interest may be included in the amount of the bond issue.

Denominations.—Although several of the State statutes contain no provisions as to denomination of bonds, most of them fix maximum and minimum limitations. The minimum wherever provided is $100 and the maximum either $500 or $1,000. Three States require the amounts to be multiples of $100.

Denominations are determined in individual cases by the probable class of investors. Several districts, for exceptional reasons, have adopted 8 or 10 denominations ranging from $100 to $500, but the great majority, due to greater convenience and consequent less expense of handling, have limited their issues to 3 or 2 or even 1 denomination. Large investors prefer the larger denominations as a matter of convenience, while persons with small amounts to invest can be reached only with the smaller bonds. In States which permit bonds of $1,000 denomination to be issued, bonds of this size are frequently combined with $100 and $500 bonds. Where $500 is the maximum, it has been the general practice to use that figure for most of the bonds issued, with often a small percentage of the issue in $100 denominations in order to attract the small investor or to comply with statutory requirements for retiring certain percentages each year.

Maturities.—Irrigation district bonds have practically all been of the serial type, a certain percentage of the issue maturing each year. In some States it is legally possible to have the entire bond issue fall due at one time; but, particularly in districts only partially settled, the advantage of spreading the principal payments over a series of years has resulted in the use of serial maturities in most cases. Some statutes provide that certain percentages of the issue shall be made to fall due in a certain series of years, but the varying conditions in different districts have caused most of the State laws to allow the electors or the supervising State officials more or less flexibility in fixing dates of maturity. Entirely different conditions obtain, for example, in a comparatively new and only partly settled district, which usually has the added burden of a considerable discount added to its capitalization, from those found in a community sufficiently developed to command a ready market for its bonds and capable of discharging its indebtedness within a short term of years. The one district is benefited in having its principal payments deferred until the income from the land becomes sufficient to take care of them, while the other reaps the advantages of having to pay less for its loan and of eliminating the unhealthy effect of postponing payments unnecessarily.

Many of the States do not allow irrigation district bonds to run for more than 20 years, although several allow 30 or 40 years.

The statutes are not uniform in their use of the words "issue" and "series" in connection with bonds. Some define an issue as the whole amount of bonds authorized at any election and a series as the part of an issue maturing in any year, while others call a series the amount authorized at an election and an issue the portion of a series sold at any time. In most States, however, "series" is used in connection with maturities, and "issue," whether specifically defined in the statute or not, commonly refers to a single bond authorization.

Disposal of bonds.—Bonds may usually not be sold without a prior advertisement for bids, although in several States the advertising may be dispensed with if par can be secured for the bonds at

private sale. The statutory provisions with reference to private sale and to exchange of bonds for construction or for completed works differ in the several States, some of the laws allowing the directors considerable latitude and others imposing restrictions. In several States such matters as the use of bonds for construction purposes, disposal of bonds at private sale, disposal at less than a certain percentage of par, etc., are subject to approval by the State bond commission. Provisions as to the price at which bonds may be sold or otherwise disposed of range from par down to 85, while two States have no minimum price limitation.

The difficulty of attempting to establish by legislation bond yields which will stand the test of a fluctuating market has appeared in the operation of irrigation districts generally and has caused several States to make their statutory provisions on this point more liberal. In California, for example, the Wright Act provided that bonds should bear 6 per cent interest and should not be sold below 90, which feature was amended in 1897 to provide for 5 per cent interest and no sales at less than par, and was again amended in 1913 to make the interest rate not to exceed 6 per cent and to remove the minimum selling price limitation. A single rate of interest fixed by statute has proved to be a detriment to some districts at times when they could otherwise have secured a lower rate, for to secure the equivalent of a lower interest rate the districts would have had to ask for larger premiums than many bond buyers would be willing to offer. Neither excessive premiums nor excessive discounts are attractive to bond investors. Restrictions against trading bonds at less than par were circumvented in many cases during the speculative eras by setting excessive valuations upon irrigation works and then exchanging such works for district bonds ostensibly at par. The nearest approach to a solution of these problems, without at the same time injuring legitimate development, has been in the liberalizing of selling price and interest requirements and in safeguarding the security by investigations and reports by State officials.

Refunding bonds.—The majority of the States authorize bonds to be refunded. Funding issues in some States may similarly be exchanged for outstanding interest, warrants, or notes, or sold to take up such indebtedness.

While the refunding privilege has been used in the financial reorganization of districts in several States in order to take up overdue bonds and interest at a discount, nevertheless the fact of refunding does not by any means imply insolvency on the part of a district. As a matter of sound business policy certain districts have refunded maturing bonds, which they could well have paid in full, because of prevailing market conditions which would have required the farmers to mortgage their farms at higher rates of interest or to call in loans bearing higher rates than the district bonds were carrying, in order to provide the district with funds to take up such bonds. Certain funding issues of this type have sold at a premium, whereas the original issues which they were designed to take up had sold at 95 or 96, the higher price of the funding bonds being due to the increase in the security resulting from the district's development.

THE BOND MARKET.

The market for irrigation district bonds during the 35 years of district history has undergone extreme fluctuations and on the whole

has been much more sensitive to district failures than to district successes. The earliest districts, after considerable effort, found an outlet for their securities in this country and in foreign markets. The failures of the early nineties, however, made the disposal of bonds on any great scale practically impossible for some years. But bonds continued to be sold in small quantities, mainly to local buyers, until the revival of interest in irrigation development during the first decade of this century caused a ready sale of irrigation securities in the Chicago and eastern markets upon the recovery from the financial depression of 1907. Then came the second series of district failures, coupled with the failure of a Chicago house which had been financing Carey Act and district enterprises, the net result of which was a second collapse of the market.

The present market is limited by several factors, important among which are the small amount of correct information on irrigation districts among bond investors east of the Mississippi and the prejudice against such bonds, particularly in the East and Middle West, as a result of the defaults mentioned. Most of the districts that defaulted 10 years ago were speculative enterprises. Many sections in which speculative bonds were sold are too far removed from irrigation centers to keep in close touch with irrigation district affairs and to learn of what the good districts are really accomplishing. Only in the irrigation States of the West has the district come into sufficiently close contact with the public to retain recognition. The old prejudice against buying district bonds is still found even in some sections of the West; but in several States, by a long process of education, strengthened by satisfactory records of local districts, markets have been built up capable of absorbing most of the sound local issues and some issues from neighboring States. Faced by the possibility, however, that local markets may not prove inexhaustible, those interested in the financing of large projects are turning their attention to means of overcoming eastern prejudice and reestablishing the market there. Within the past year a few issues have been sold in Chicago, St. Louis, and New York.

Irrigation district bonds, which are sometimes referred to as "municipals," usually bear higher interest rates and sell to net higher yields than do the true municipals. Municipal bonds as a class are much more numerous, older, and more seasoned than district bonds and have outgrown the effects of early cases of default. Likewise the element of hazard, which enters in greater or less degree into agricultural and reclamation undertakings, is less pronounced in the case of municipalities. These factors necessitate a greater amount of advertising for district bonds, the cost of which, together with other greater expenses of handling, selling risk, etc., makes the margin between the price dealers pay for the bonds and the price at which they sell them to the ultimate investors usually greater than that for good municipal bonds. This margin grows smaller in the case of old settled districts with established reputations.

Measures taken in recent years to strengthen State supervision over district activities, and particularly to provide for State certification of bonds of feasible projects, are generally thought to have had a very beneficial effect upon the salability of bonds. Most bond houses in States which have provided for certification handle only

certified issues. While the bond house relies upon its own investigation of the desirability of taking the issue, as well as upon the State report, the fact of certification makes the issue more attractive to the average investor and is consequently an important selling point.

During the last few years a tendency has developed toward eliminating the word "irrigation" from the official designations of irrigation districts and substituting some equivalent term, such as "water conservation," "water conservancy," or "water improvement." Some of the recent statutory amendments permit and others require the new terms to be used. These changes are designed to afford districts an opportunity to prove the merits of their bond issues without having to encounter the initial handicap still attaching to the term "irrigation" in some places.

The fact that irrigation district bonds, in common with other municipal and quasi-municipal securities, are exempt from Federal taxation is thought to have had an important bearing upon the more active market in recent years in sections where districts are favorably known. In some States such bonds are free from State taxation as well.

CHARACTER OF IRRIGATION DISTRICT BONDS.

Speculative or nonspeculative character.—Bonds of irrigation districts may be divided into two general classes on the basis of the character of the enterprises issuing them. A district which includes lands valuable enough without irrigation to furnish adequate security for its obligations, and which is sufficiently developed to insure revenue for making all payments promptly, may issue bonds which are truly an income-producing investment. On the other hand, a project which has no security to offer beyond that to be created with the proceeds of its bonds, whether honestly conceived or otherwise, is essentially a speculative undertaking. Bonds issued by districts of these two classes have borne approximately the same rates of interest and have carried nothing else on the face of the bonds to indicate the extent of the security. Furthermore, in the periods of indiscriminate buying of irrigation securities, bonds of speculative districts often retailed, at prices comparable with those of sound bonds, to purchasers whose intent was to invest rather than to speculate. It was the failure to discriminate between these types of security that permitted so many questionable undertakings to be financed during those periods.

The theory of State certification of bonds as legal investment for bank and trust funds is based upon a recognition of two distinct classes of irrigation bonds. The application of this theory, by putting the purchaser on his guard, tends to make more difficult the sale of speculative bonds from States which have provided for certification. In such States, therefore, while feasible projects of the speculative class may still organize as districts, the failure of the bonds of such districts to bear State certification carries the implication of a possible lack of adequate immediate security.

Financial reorganizations.—While some projects contained so little merit as to result in complete abandonment, others unable to meet early obligations were sufficiently worthy to give promise of eventual success if relieved of part of their burdens. Certain enterprises of

this sort met difficulties because settlers failed to arrive in sufficient numbers and with adequate means to put the land on a paying basis in time to meet the interest charges. The bondholders under such circumstances, realizing that to pursue their legal remedies would merely result in forcing the settlers off the lands, agreed in certain cases to write off a portion of the debt in order to assure ultimate payment of the balance. Financial reorganizations involved pooling the interests of bondholders on the one hand and landowners on the other, negotiations between the two groups, and surrender and cancellation of overdue bonds and interest coupons at an agreed discount. Bondholders were often widely scattered and some bondholders and landowners were opposed to any compromise, so that it was not always possible to bring all interested parties into the agreement. The procedure in such event consisted in selling bonds and coupons of proper maturities to the landowners for use in paying taxes, thus releasing the lands covered by the agreement from the lien for those taxes and leaving the bondholders not in the agreement to obtain satisfaction from the lands not so covered—a solution legally possible where the district tax is held to be a special assessment rather than a general tax.

PRESENT STATUS OF BONDS.

Figure 4 shows the status of all bonds sold to December 31, 1921, segregated by years in which actually sold. The disposition of these bonds has been as follows:

Outstanding Dec. 31, 1921	$104,921,223
Redeemed	5,091,070
Declared illegal	3,369,350
Canceled after compromise	4,556,900
Discount on bonds refunded after compromise	497,900
Total bonds sold	118,436,443

For purposes of comparison irrigation district history has been divided into five seven-year periods and of the total amount of bonds sold during each period the percentage paid when due, compromised, defaulted, etc., has been ascertained. The results are shown in Figure 5. When considered in connection with Figure 4, which shows the volume of bonds sold from time to time, the chart contains a striking summary of the history of irrigation district bond integrity. The first and fourth periods, as well as the latter part of the third, were times when speculation was rife. The more satisfactory situation during the fifth period is partly a result of more effective State control, State certification of bonds, greater discrimination on the part of bond buyers, and more general conservatism in the promotion of districts.

Table 4 contains a summary of the bonded indebtedness of all irrigation districts in the United States to December 31, 1921. The last column shows for each State the average outstanding bonded debts per acre of all operating districts which are fully financed to date; that is, of all districts which are "going concerns" and which have secured the necessary funds for their present purposes.

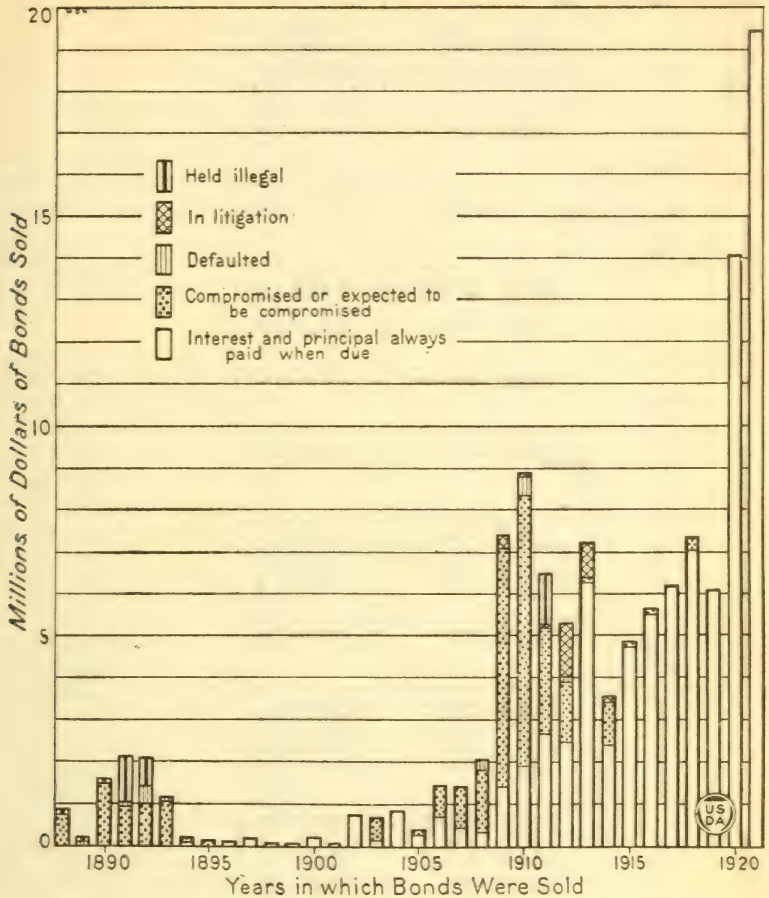

FIG. 4.—Status December 31, 1921, of all bonds sold by irrigation districts in the United States. The symbols are not superimposed upon each other.

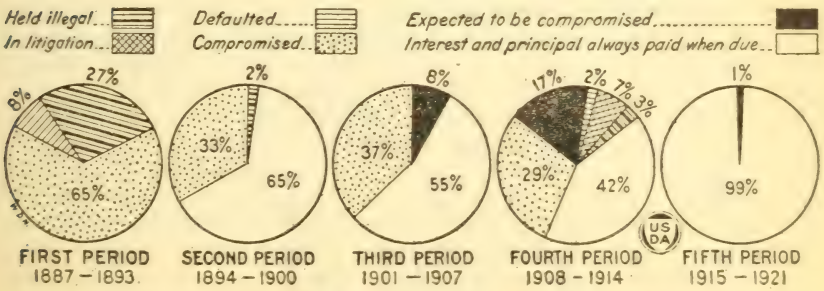

FIG. 5.—Comparison by seven-year periods of status of irrigation district bonds sold to December 31, 1921.

TABLE 4.—*Summary of bonded indebtedness of irrigation districts in the United States, December 31, 1921.*

State.	Bonds.			Districts having voted bonds.			Districts having bonds outstanding.			Operating districts fully financed to date.		
	Voted.	Sold.	Outstanding.	Number.	Area.	Bonds voted.	Number.	Area.	Bonds outstanding.	Number.	Area.	Outstanding bonded debts.
					Acres.	*Average per acre.*		*Acres.*	*Average per acre.*		*Acres.*	*Average per acre.*
Arizona	$3,628,975	$70,500	$70,500	6	120,081	$30	2	18,040	$4	1	13,840	$4
California	110,149,011	50,654,531	45,716,061	84	3,846,682	29	48	2,327,905	20	40	1,894,216	24
Colorado	52,732,600	25,384,400	20,919,200	59	1,521,915	35	34	821,040	25	24	521,942	30
Idaho	22,976,214	6,476,500	5,494,750	44	690,620	33	31	386,351	14	28	345,851	13
Kansas												
Montana	4,405,000	2,293,500	2,211,200	34	221,244	20	20	81,999	27	20	81,999	27
Nebraska	4,596,382	4,151,682	3,346,182	29	290,169	16	18	173,729	19	18	173,729	19
Nevada	918,500	412,500	412,500	1	190,796	5	1	190,796	2			
New Mexico	1,450,000	436,000	186,000	4	74,372	19	2	23,872	8	1	14,872	11
North Dakota												
Oklahoma												
Oregon	20,961,000	7,636,800	7,437,800	28	502,086	42	21	391,360	19	17	181,080	37
South Dakota												
Texas	12,597,000	11,003,000	10,849,000	16	538,724	23	14	526,871	21	11	442,871	23
Utah	4,011,000	2,150,600	1,060,100	10	123,823	32	5	35,581	30	5	35,581	30
Washington	38,510,430	6,805,430	6,499,430	52	1,083,189	36	40	986,909	7	31	137,659	42
Wyoming	4,491,000	961,000	718,500	6	145,750	31	3	43,250	17	3	43,250	17
Total or mean	281,427,112	118,436,443	104,921,223	373	9,349,451	30	239	6,007,703	17	199	3,886,890	25

STATE SUPERVISION.

The policy of requiring State officials to inquire into the desirability, from a public standpoint, of forming an irrigation district first received legislative sanction in Idaho. The failures of the early nineties had caused the California Legislature in 1897 to make more stringent the conditions precedent to formation and bonding of districts without, however, imposing outside control. But Idaho in the same year, 1897, required the State engineer to examine and make an advisory report upon plans of each district prior to a bond election, and in 1907, after having tried several different checks on the formation of districts, settled upon the plan now in effect. With the sole exception of Kansas, the other States having district laws have since provided for State supervision in one form or another.

CHARACTER OF SUPERVISION.

Control by the State applies in certain cases to the formation of the district and in others to plans and estimates formulated later. One theory is that no irrigation district should be organized at all unless there is ample indication of its feasibility and the sufficiency of its proposed water supply. The other thought is that the formation of districts should be encouraged to the end that machinery may thus be provided for the actual investigations of feasibility and water supply, but that actual construction of works or issuance of bonds shall be subject to State approval. With reference to bond issues, one plan is to have the State investigate and report prior to all proposed issues, and a further plan is to establish certain standards which bonds must conform to if they are to receive State approval as investment for certain types of funds. The usual supervision is advisory rather than mandatory.

Organization.—In Idaho and California investigations and reports are required prior to the formation of irrigation districts, which reports if adverse are sufficient to prevent formation unless three-fourths of the landowners petition otherwise. The organization petition in Wyoming must contain an engineering, water-supply, and land report bearing the approval of the State engineer. In Texas the State board of water engineers hears the petition for organization of any district lying in two or more counties and may grant or deny the same, its decision being final; but the county commissioners court, subject to appeal to the district court, has jurisdiction over the formation of districts lying wholly within one county. Districts in Oregon and New Mexico may be formed at will, but must go to the State engineer before proceeding further. In Washington the director of conservation and development sits in an advisory capacity with the board of county commissioners on the question of organization, the board's discretion, however, extending only to fixing district boundaries for which a water supply is deemed available. Montana, which has provided for an alternative type of irrigation district organized and functioning under State supervision, has imposed no restrictions on the formation of districts of the older class. In Utah the State engineer is required to make a water survey and allotment of water to each 40-acre tract in the proposed district, or smaller tract if in separate ownership, before the district may be declared organized. In Nebraska, Oklahoma, South Dakota, North Dakota, and

Colorado investigations and recommendations are provided for by State officials prior to district formation, but are not conclusive upon the district electors, the purpose being simply to make known the conclusions reached.

In actual practice the State engineer or other corresponding official receives a copy of the petition from the county body or from the petitioners, checks the preliminary plans, and as a rule either visits the proposed district in person or sends a deputy to make such actual field studies as time and available funds may permit. Comparatively few proposed districts have been completely disapproved by the State. However, it is not unusual for the State engineer to call attention to the lack of certain information or to require additional data or the elimination of certain tracts of land before granting approval.

Plans and estimates.—Idaho, Nebraska, California, Oklahoma, South Dakota, North Dakota, Arizona, and Colorado have all provided that the plans and estimates of the district directors formulated before issuing bonds shall be reviewed by State officials, but have not made the resulting State recommendations binding upon the districts. However, the California and Arizona statutes provide that districts issuing bonds to carry out any plans approved by the State may make no material change in such plans without the State's consent. In Oregon both plans and completed work must be approved by the State engineer. In New Mexico, where the report on water supply must be approved by the State engineer, with an appeal from his decision to the courts, no bonds may be issued until the report shall have been approved by the State engineer or the courts. The disposal of bonds is subject to partial control by the State in California, Oregon, Utah, Nevada, and Arizona, and to full control in Montana in case of those districts operating under State supervision.

State supervision over plans and estimates upon which bond issues are to be based necessarily goes farther than over the question of formation of the district, for it involves definite costs of construction, which are sometimes dealt with only in a general way when organization is being considered, and is deeply concerned with security for the bonds. It sometimes occurs that the bond issue proposed, and which the State is to inquire into, is inadequate to complete the construction called for, in which case it is the function of the State to revise the estimates and recommend a greater bond issue. Likewise the maturities proposed may not be best suited to the particular type of district. That is, a comparatively undeveloped district may be proposing to issue short-term bonds which it would have little likelihood of being able to retire when due; or, on the other hand, a well-settled district, fully able to discharge capital indebtedness at an early date, might plan to throw a heavier burden upon posterity than justified. Proper maturities are advised in such cases.

Security for the bonds involves many factors, important among which are the value of the land, adaptability of certain crops, potential earning power, relation to markets, sufficiency of the water supply, feasibility of the plans, limitation of indebtedness, degree of settlement of the land, and character of the settlers. All these influences must be considered in determining the proper amount of bonded indebtedness to be created against a district to insure prompt payment of the interest and principal. While the district electors and

district officers in any given case may be perfectly capable of deciding the amount of indebtedness they wish to incur and may use good judgment in reaching their decision, nevertheless it is the modifying influence of a public viewpoint, shaped by a knowledge of State-wide conditions and past experience and unhampered by purely local considerations, that the various statutes on this subject have attempted to provide. Such examination is usually made by the State engineer, though in several States by commissions composed of the heads of the engineering, banking, and legal branches of the State governments.

Certification of bonds.—A step farther in the matter of State control over bonds of irrigation districts is the certification of such bonds as legal investment for funds in which the law allows county, school, and strictly municipal bonds to be invested, and the consequent elevating of certified bonds to a higher plane than those not certified. Submission of bonds to the State for such purpose is voluntary, but in most States districts that have had any bonds certified are forbidden to issue further bonds without certification.

The principle of State certification was first worked out in California in 1911 and has since been introduced into Oregon, Utah, Nevada, Idaho, Colorado, Montana, and Arizona. It grew from a desire to provide a wider market for sound irrigation district bonds and to put them on the same basis for investment purposes as bonds of other public corporations; in other words, to give notice to the world that the State has investigated the bonds of a particular district and approves them as investment for trust and savings funds. Indirectly, by setting a high standard for such bonds, the State makes it more difficult for bonds of undesirable districts to find a ready market than might be the case otherwise.

The California plan, upon which those of the other States are based, is as follows: The directors of a district who wish to have bonds certified make application in prescribed form to the California Bond Certification Commission, composed of the attorney general, State engineer, and superintendent of banks. The commission makes an investigation dealing with water supply and water rights; fertility of the soil, susceptibility to irrigation, probable duty of water, and probable need for drainage; feasibility of the irrigation system; reasonable market value of water, water rights, and all irrigation works owned or to be acquired or constructed with the proceeds of the bond issue; reasonable market value of the lands in the district; and ascertains whether or not the aggregate amount of bonds of the district, including those under consideration, exceeds 60 per cent of the aggregate market value of lands and water, water rights, and irrigation works owned or to be acquired. No bonds may be certified if the aggregate amount exceeds the 60 per cent limitation. If the commission's report is favorable, the bonds thus approved are certified by the State controller, whereupon they become a legal investment for all trust funds and for funds of all insurance companies, banks, trust companies, and State school funds, and enjoy the same privileges as bonds of cities, cities and counties, counties, school districts, and municipalities with reference to purposes of investment and deposit as security for the performance of any act. As many consecutive issues of bonds may be certified as the commission may deem proper, but no subsequent issues are permitted without cer-

tification. No expenditures may be made from the proceeds of certified bonds until the commission shall have approved a schedule of proposed expenditures. Irrigation district bonds certified under this plan constitute approximately one-fourth of the total amount of bonds now on deposit with the State treasurer of California as security for the deposit of State funds in banks.

The State of Oregon has made the sale of bonds, or the ability to sell them, a condition precedent to certification in order to avoid flooding the market with unsold certified bonds.

To July 1, 1921, the following total amounts of bonds had been certified in the several States:

California	$40,724,511
Oregon	7,595,500
Utah	600,000
Nevada	400,500
Total	49,320,511

OPERATION OF STATE CONTROL.

State control over district activities has advanced slowly in the face of opposition by many established districts, by persons who have feared the influence of political considerations upon decisions of State officials, and by others whose viewpoint has been purely speculative. Efforts made in Colorado, and recommended by each succeeding State engineer, to provide some check upon the rapidly increasing speculation in district bonds during the first decade of this century came to naught largely, it is stated, because of the influence of persons interested in unhampered promotion of irrigation districts. But the prevailing tendency has been to strengthen State control, rather than to limit it, because of the salutary influence it has exercised in restraining the promotion of "wildcat" enterprises. An effective State supervision makes the financing of a project without engineering or economic justification very difficult. The various State officials, in administering district affairs, have very generally shown their feeling of public responsibility in guarding the State from the consequences of possible failures.

While the statutes are the foundation for State supervision, nevertheless the administrative policy of each State is equally important, for States having the same general statutory provisions often exercise different supervision. Some flexibility exists, for instance, in determining the economic feasibility of a project, a matter of the utmost importance, particularly when the certification of bonds is under consideration.

During the larger development of recent years a practical difficulty has arisen in supervising district expenditures. In California particularly, with its large amount of certified bonds, this condition has led the State engineer's office to consider installing a uniform system of accounting for expenditures from the proceeds of such bonds. Most of the States now require their State engineers or corresponding officials to be kept informed of district activities through reports made annually and sometimes on more frequent occasions. It has proved very important from the State engineer's standpoint that he be kept in touch with all matters pertaining to organization, bonding, progress of construction, and general operation of irrigation districts;

for he is the official whom custom has placed in closest contact with district operations and upon whom devolves most of the State's responsibility.

STATE FINANCIAL AID.

The question of public aid to irrigation districts for the purpose of stimulating or making possible needed development has been under discussion many times. Efforts made from time to time to induce Congress to provide for Federal guaranty of district bonds have not yet been successful. A number of the States, however, have granted statutory authority for the investment of State funds in irrigation district bonds, and several have actually made such investment.

Utah.—Utah in 1911 authorized funds derived from the sale or rental of State lands to be used in purchasing irrigation district bonds. Apparently this was not a well-defined policy of public aid to districts, for it was accomplished merely by enlarging the scope of investment of State land funds and introduced no new features. A total of $90,200 was invested in bonds of three districts during the next two years. As two of the investments proved unsatisfactory, the amendment was repealed in 1915. The State has since disposed of its interest in one of the districts at a nominal figure.

California.—In 1915 and 1916, when the market in California was less favorable than it became later, the State purchased $75,000 of certified bonds of two districts from the teachers' permanent fund and school land fund. Two objects were in view—to make a good investment, and to aid the districts in selling bonds by showing the bond-investing public that the State had confidence in the districts. In 1920 and 1921, $65,000 of bonds of three districts were bought for investment purposes, partly at a premium, from the compensation insurance fund.

Nebraska.—For several years Nebraska has been making purchases of irrigation district bonds from the permanent school fund. To date $271,000 of bonds of six districts have been purchased. The question of aid to districts has not figured prominently in these purchases. They have been made from the standpoint of the most satisfactory investment of the school fund, with preference to local securities.

Washington.—Washington has developed an announced policy of granting aid to irrigation districts through the purchase of their bonds. To this end the legislature provided in 1919 that the State reclamation revolving fund, raised by an annual levy of one-half mill upon all taxable property in the State, might be used for investment in bonds of reclamation districts, including irrigation, diking, and drainage districts. To July 1, 1921, $497,000 of bonds of six irrigation districts had been purchased.

Owing to the limited amount of money made available, Washington has not been able to carry its policy far, but has begun to formulate principles which in time may have a far-reaching effect upon irrigation development within the State. The fund is a revolving fund in the sense that the State intends to sell these bonds as soon as a market develops for them and to apply the proceeds to the development of other districts. District bonds are bought by the State at 90, which is the lowest price at which they may legally be sold, on the theory that the State is buying these bonds as a matter of assistance only

because no other purchaser can be found, and that if the district can sell the bonds elsewhere for more than 90 it has no need of State assistance. In other words, some incentive is given the district to seek purchasers in the open market. The director of conservation and development construes the law to limit such purchases to development purposes, rather than to include improvements needed by already developed communities. Up to the present time the State has in no instance bought the entire bond issue of an irrigation district. The purpose has been to give limited aid where possible by buying partial issues at 90 and reselling them at the same or higher figures when the development thus made possible shall have enhanced the security for the bonds and made them more attractive to private investors. The difficulty with this plan, however, is that partial assistance does not always accomplish the purpose sought, particularly if the district is unable to dispose of additional bonds; and it is now felt by the administration that the State could be better served by taking a single project and seeing it through than by spreading smaller amounts of money over a number of projects.

The Washington officials investigate a district very thoroughly before buying its bonds, inquiring particularly into the water-supply and engineering features, soils, and general feasibility. The market value of the land without water is not considered, however, owing to the fact that areas in need of reclamation in eastern Washington have often only a nominal value without irrigation. The prospective value of the land when put under irrigation is the criterion. The State of course reserves to itself the right to exercise close supervision over the expenditure of funds turned over to the district for such bonds.

Oregon.—In Oregon a different form of State assistance to irrigation and drainage districts was put into effect in 1919. This involves the payment by the State of interest on district bonds for periods of not to exceed five years. The purpose is to give districts an opportunity to get on a paying basis before any demands for interest shall fall due. To this end it is provided that the money advanced by the State for payment of interest shall be repaid after the maturity of the last bond on which the State has paid interest. Funds are obtained by the State for such purpose by the sale of State bonds upon which the districts benefited are required to pay interest, so that the State, although lending its credit, is fully reimbursed for expenditures. The amount of indebtedness that the State may incur for this purpose is limited to 2 per cent of the assessed valuation of all property in Oregon. To August 1, 1921, the interest on $4,042,500 of bonds of four irrigation districts had been paid and State bonds in the amount of $390,300 had been issued to finance the payments.

Administration of the Oregon method is in the hands of the commission designated to handle the certification of bonds, viz., the State engineer, the attorney general, and the superintendent of banks. The law does not require, as in the case of bonds considered for certification, that the aggregate amount of all bonds shall not exceed 50 per cent of the aggregate market value of lands, irrigation works, etc., for the aim of this policy is not to duplicate the purpose of bond certification, but rather to give assistance to districts not yet able to stand on their own feet. Its purpose is development, rather than

improvement. Along this line a prerequisite not required in the case of certification is a complete survey of acreages irrigable, farmed, cleared and irrigated, cleared and dry farmed, and unreclaimed. A further showing must be made of all acreages that will be for sale if the reclamation works are built and that are covered by specific agreements between the owners and the district for sale at fixed prices, preference in their purchase being given ex-service men and women.

Other States.—Recent attempts have been made in three other States to provide public financial aid for irrigation districts. The State engineer of Wyoming, in the fifteenth biennial report, published in 1920, made very strong recommendations for State assistance in financing sound irrigation projects on the ground that the need of further irrigation development in Wyoming is urgent. In Montana an initiative measure to provide for financing irrigation districts to the extent of $20,000,000 by the issue of State bonds and use of the proceeds in purchasing irrigation district bonds was defeated at the general election held November 2, 1920, by the comparatively close vote of 76,949 to 68,785. The last legislature of Arizona submitted to popular ballot a constitutional amendment authorizing the issuance of State bonds in aid of irrigation districts, which owing to certain technical difficulties did not get to a vote.

So while no State has yet gone far along the line of developing its irrigation resources through the medium of public aid to irrigation districts, nevertheless recent developments in Washington, Oregon, Wyoming, Montana, and Arizona indicate the trend of thought on this subject. Two different viewpoints have governed the purchase of district bonds with State funds—investment and development—and the selection of bonds has varied accordingly. Where the prime motive has been investment, the State has chosen bonds satisfactory from the standpoints of security and net return and has made purchases mainly in small blocks. On the other hand, where the benefit to accrue to the State from the development of resources has been sought, in addition to or aside from the benefit of a good investment of State funds, the conclusion has been reached that the public funds should be placed where they would do the most good, even to the point of purchasing bonds much of the security for which remained to be created and of assuring the project that the State would carry it through to completion.

RELATIONS WITH THE UNITED STATES.

UNITED STATES RECLAMATION SERVICE.

The most prominent relations between irrigation districts and the Federal Government have been with the Reclamation Service. Districts which have had such dealings may be subdivided into two classes:

(*a*) Districts formed at the instance of the Reclamation Service on reclamation projects, as substitutes for water users' associations, "for the assumption as principal or guarantor of indebtedness" of project lands to the United States.

(*b*) Districts which have contracted with the United States, under the provisions of the Warren Act, for the purchase of water supplies or for the construction of irrigation or drainage works or both.

The water users' associations were mutual stock companies composed of settlers on reclamation projects, designed as instruments through which the Reclamation Service could deal with the settlers and through which the settlers could eventually operate the systems. While successful in some cases, the associations failed generally, from the standpoint of the Reclamation Service, to give complete satisfaction. Voluminous bookkeeping was involved, for every landowner had a separate contract and required a separate account. Furthermore, the only remedies in case of nonpayment of charges were individual suits, and there was no means of compelling lands within projects which had not applied for water rights to contribute their share toward operation and maintenance. On the other hand, disadvantages to the settler lay in his inability to secure a Federal farm loan even on private land while the water-right contract remained a first lien, and in the necessity of including the contract in any abstract of title.

For these reasons the Reclamation Service came to favor the irrigation district as the more serviceable organization through which to deal with project settlers. The irrigation district plan offered one contract in place of many. The Government would no longer be concerned with individual accounts, and collection of charges would become a part of the district or county machinery provided for collection of taxes. Furthermore, the Reclamation Service was able to call the settlers' attention to the greater ease and cheapness of making collections through the irrigation district machinery after they should have taken over the control of the irrigation system. To this end the policy has been pursued in recent years of securing amendments to the State laws providing for contractual relations between irrigation districts and the United States, and of urging settlers on many of the projects to adopt the irrigation district in place of the existing water users' association. The result has been that all of the States except Kansas that have irrigation district laws have now authorized districts to cooperate with the United States, and that districts have been organized on many of the Federal reclamation projects. The only districts that have taken over the management and control of the project systems are Minidoka irrigation district, Idaho, and several small districts operating as independent units of the Yakima project, Washington. The functions of the other districts consist solely, at the present time, in guaranteeing and collecting charges due the United States, or in representing the project settlers prior to the execution of contracts for the repayment of existing or future charges.

While the forms of contract between these districts and the United States have varied, the essential features of agreements for complete substitution of irrigation districts have been the dissolution of water users' associations where they have previously existed, the discharge of liens contained in stock subscription contracts, and the assumption by the irrigation districts of all indebtedness due the United States, the charges to be collected by the districts under their general taxing power. In actual practice thereafter the Reclamation Service determines the annual amounts due for various purposes and the district levies assessments to meet such charges and turns the money over to the United States at the times provided in the contract.

Districts of the above class, with the exception of King Hill irrigation district, Idaho, which has had a unique history, have been formed at the instance of the Reclamation Service on the reclamation projects proper. Other irrigation districts, however, originally formed independently of the United States, have found it to their advantage to contract with the United States for the purchase of water supplies or for the construction of irrigation systems without strictly becoming a part of any Federal reclamation project. The Warren Act,[3] passed in 1911, authorized the sale of water in excess of the requirements of the authorized projects to individuals and various types of associations including irrigation districts, and the cooperation of the United States with such bodies for the construction and use of irrigation systems. Districts of two classes have contracted under this act—those needing total or partial supplies of water, other provision having been made for construction of works, and those which desired irrigation or drainage systems to be constructed by the Reclamation Service. Up to the present time, in addition to the fact of securing financial aid, the greatest advantage to the districts of this plan over that of disposing of bonds in the open market is that interest has not been required on deferred payments. The United States has also reaped benefits from these contracts. Wider markets have thus been secured for water developed, to which end the Reclamation Service has been willing to construct systems for districts adjacent to projects to the extent of available funds. Furthermore, in connection with the drainage of Boise project, Idaho, the Reclamation Service has been able to construct drainage systems for neighboring irrigation districts that have been of material benefit to the project as a whole.

It was the original policy of the Reclamation Service to require the deposit of bonds to secure the payment of contractual indebtedness over a period of years, but with the clarifying of State statutes on the subject the assessment for payments called for in the contract is now considered a sufficient lien upon the land. The only districts required to deposit bonds were the first ones to enter into such contractual relations in Yakima Valley, Wash.

UNITED STATES INDIAN IRRIGATION SERVICE.

District relations with the Indian Service have been very limited. Contrary to the policy of the Reclamation Service, the Indian Irrigation Service has not encouraged the formation of irrigation districts on the Indian projects. The needs of the case, of course, are different, for the reclamation projects are designed for eventual operation and repayment by the settlers themselves, whereas the Indian projects may continue under Federal operation indefinitely.

Nevertheless it was felt by the white settlers on Yakima Indian Reservation, Wash., whose lands comprise a large portion of the Wapato project, that an organization was needed through which to deal with the Indian Service. So an irrigation district was formed there to include the "white" lands and any additional lands that might thereafter come into white possession. For the present the sole function of the district is to afford a medium through which the white settlers and the project management may consult.

[3] 36 U. S. Stat. 925.

There have been only a few cases of cooperation between irrigation districts and the Indian Service in the construction and ownership of irrigation works.

UNITED STATES GENERAL LAND OFFICE.

Relations with the General Land Office deal with the inclusion of public lands in irrigation districts. Prior to 1916 the various State courts that had passed on the subject held conflicting views as to the liability of public lands of the United States for district obligations, both before and upon the issuance of patent. But the situation was cleared when Congress in 1916 passed the Smith Act,[4] which subjects both unentered and entered, but unpatented, public lands to the district lien in districts approved by the Secretary of the Interior and not comprising a majority acreage of unentered land.

An irrigation district desiring to come within the provisions of the Smith Act is required to submit an application to the local land office containing data on organization, water rights and water supply, plans and specifications, and to file maps upon which land ownership is classified. Where the unpatented lands lie within a Federal reclamation project, the application is referred to the Reclamation Service for a report as to feasibility, otherwise the General Land Office makes its own investigation of feasibility of the irrigation system. Upon approval by the Secretary of the Interior, the irrigation district files with the local land office a list of assessments against each legal subdivision of public land. Although unentered land is not subject to tax sale, and the United States does not become obligated for assessments, nevertheless these charges constitute a lien against the land which must be removed before entry is allowed. Entered but unpatented land, however, may be sold for taxes, in which case the purchaser assumes the rights of the original entryman.

In connection with applications for Carey Act segregations and desert land entries the General Land Office has had occasion to investigate a number of irrigation districts.

OTHER SALIENT FEATURES.

APPORTIONMENT OF WATER.

The purpose of the irrigation district is to provide a water supply for the irrigation of lands included within its boundaries. This purpose includes distributing as well as procuring the water supply.

The first question that naturally arises under water distribution deals with the amount to be delivered to each user. Where an irrigation district takes over a going irrigation company, it usually takes it subject to any existing rights of individual tracts to receive definite quantities or proportionate quantities of water. But if a new system is to built, or additional land included, or additional supplies of water obtained for already wholly or partially irrigated lands, it then becomes necessary to determine just how the water is to be divided. Some of the States have not legislated on this subject other than to provide that the directors shall adopt rules and regulations for the equitable distribution of water.

[4] 39 U. S. Stat. 506.

The California law has always provided that district lands shall be assessed at their full cash value, and that water shall be apportioned according to the ratio of the last assessed valuation of each tract to the total district assessed valuation. In other words, the more valuable a tract the more water it is entitled to. The same rule holds in Nebraska and Oklahoma. However, water has seldom been actually apportioned according to this plan, for to enforce such provision strictly would result in giving a totally insufficient quantity of water to a tract of porous soil, with a normally high water requirement, yet which might be so low in fertility, or so far removed from transportation facilities, that its assessed valuation would be relatively low.

Other States provide that water shall be distributed pro rata; that is, an equal amount to each acre. Still other States, of which Washington is an example, require that the board of directors shall provide for "the equitable distribution of water to the lands within the district, upon the basis of the beneficial use thereof," which is the end that most well-conducted irrigation enterprises strive to attain. The Utah provision for an allotment by the State engineer before the district organization, with a final revision after organization and after the amount of water available has been determined, is a refinement of this principle in that it embodies a survey of all existing water rights, classification of the soil, determination of the water deficiency on each tract, and a resulting determination of the amount of water to be supplied by the district to each tract.

Authority to charge tolls for water, which is granted by most of the States and which has been taken advantage of to some extent, offers a means of apportioning water in any particular year according to the needs of the water users.

Irrigation districts are often given conditional authority to sell or rent excess water to outside lands.

EMINENT DOMAIN.

An important power granted by all the State statutes to irrigation districts is the right of eminent domain—the power to condemn land, water, water rights, and other property necessary to the purpose of the district. In California an irrigation district, in common with other political subdivisions, may take immediate possession upon bringing eminent domain proceedings and depositing the required security. California furthermore authorizes an irrigation district to condemn the use of property of another irrigation district so long as it does not interfere with use by the district first acquiring the property. Under this authorization Waterford irrigation district in 1915 instituted proceedings to acquire the right to enlarge the main canal of Modesto irrigation district for the conveyance of water to the Waterford lands, but the case was settled without going to trial.

DRAINAGE.

The right to construct drainage works is now generally recognized to be as vital to the success of an irrigation district as is any other of its powers. Although such provisions were not included in the early district laws, the experience of all types of irrigation enterprises has brought the question of drainage of irrigated lands very much to the fore and has resulted in effecting legal means in practically all of

the States for the undertaking of drainage by irrigation districts. Up to the present time, however, comparatively few irrigation districts have done drainage work on any great scale. Very frequently only portions of districts have become affected by the rise of water, in which cases the general tendency has been to afford local relief only and to leave preventive measures to the future; for the possibility of future injury has proved to be a far less potent incentive to the expenditure of money for drainage construction than has the injury that has already become visible.

In such sections as Yakima Valley, Wash., the numerous irrigation districts have been largely relieved from the consideration of drainage problems by the widespread existence of drainage districts. The important thing naturally is to get the land drained by whatever kind of district is most practicable. Without reference to the merits of either type of district in any given case, however, it is highly advantageous for an irrigation district to be allowed to construct drainage systems. In certain cases, for example, relatively small amounts of such work need to be done. Again, it may prove easier and speedier to accomplish such work by an existing organization than to organize another district to do it. Furthermore, with the knowledge of what has happened elsewhere, the simultaneous consideration of irrigation and future drainage problems by a new irrigation district may result in an ultimate saving of money. Finally, as a matter of self-preservation the power of an irrigation district to relieve its own water-logged lands and make them valuable again is of the utmost importance.

The Reclamation Service has cooperated with adjoining irrigation districts in drainage construction on Boise project, Idaho; Klamath project, Oregon, and North Platte project, Nebraska. Such cooperation, which has been in addition to drainage cooperation with irrigation districts on the projects proper, has consisted usually in the construction of drainage works for the irrigation districts as parts of the general project drainage systems. In other cases the right to discharge drainage water from district systems into the project ditches has been the subject of contract.

Instances of drainage construction by irrigation districts, financed either by special assessments or by bond sales, are found in a number of the States, particularly Nebraska, Idaho, Oregon, and California. The plans of certain recently organized California districts have contemplated drainage construction as an integral part of the districts' engineering plans and the use of the drainage water for the irrigation of other lands.

ELECTRIC POWER.

The development of electric power by irrigation districts and its use either within or without the districts are authorized in several States as a means of making the irrigation plan more effective. As yet, however, very little advantage has been taken of this authority. Several districts in Oregon and California propose to tide over the initial years of operation through revenue derived from the sale of power. A different phase of the subject appears in the operation of Yuma irrigation district, Arizona, which has fulfilled its sole purpose of organization by constructing a transmission and distribution system for the delivery of power purchased from a company for use by individual pumping plants within the district.

INCLUSION OF MUNICIPALITIES.

Cities and towns may be included in irrigation districts and assessed for district purposes in California and certain other States, but in other States may not be so included. In Oregon, for example, residence property may not be included in districts, but city or town property used or suitable for agriculture is subject to inclusion. The justification for including town lots, which may themselves never be irrigated, is that some municipalities owe their existence in whole or in part to the success of surrounding irrigation districts and should consequently be made to share in the districts' upkeep. While the danger has sometimes been feared of the control of district affairs by city residents, particularly in California where the general election laws apply, nevertheless it usually happens that city residents take much less interest in district affairs than do the farmers and have seldom been known to control affairs for their own peculiar advantage.

The right to include and assess town lots has been misapplied in one Nebraska district which has leaned too heavily upon revenue derived from town assessments and is consequently involved in litigation over the matter.

INCLUSION OF PUBLIC LANDS.

The inclusion of public lands in irrigation districts is of course at the option of the Federal or State Governments holding title to such lands.

The question of including public land of the United States has been discussed heretofore under the relations of irrigation districts with the General Land Office. As stated, congressional authority now exists for the inclusion of unpatented land under certain conditions at the discretion of the Secretary of the Interior.

Several States also, recognizing the possible hindrance to development by withholding State lands from inclusion in irrigation districts, have made provision for such inclusion under defined restrictions and under the supervision of the proper State officials. Such provisions usually deny the right of districts to assess the State, but either grant liens similar to that contained in the Smith Act or authorize the State land offices to contract with individual districts for the payment of assessments by the State.

LOCAL IMPROVEMENT DISTRICTS.

The plan of permitting subdistricts to be organized for local improvement purposes within irrigation districts was first worked out in Washington. It was proposed at one time to organize one large irrigation district to include all lands irrigated from the Sunnyside Canal system of the Reclamation Service in Yakima Valley. This system serves lands under widely divergent conditions, embracing gravity and pumping systems and areas more lately put under irrigation which are reached by more costly construction than that needed for the earlier irrigation. If this entire system were included in one irrigation district there would be certain units under heavier construction and operation costs than other units. This situation gave prominence to the idea of authorizing the users under one lateral or other unit of an irrigation district to make repairs or reconstructions or to construct extensions themselves and to handle the cost of so doing. Such local improvement would also include drainage work.

In 1917 Washington authorized the creation of local improvement districts within irrigation districts. Provision is made for the formal organization of such a local district by petition of the owners of one-fourth of the acreage to the board of directors of the irrigation district and hearing before the board of directors, or by initiation of proceedings by the directors themselves, a protest by a majority of holders of title to lands within the proposed local district being sufficient to prevent formation in either instance. No local government is provided for, all affairs being handled by the central board of directors, who adopt plans, issue local improvement district bonds, and consummate the work. The bonds may bear a higher rate of interest (8 per cent) than the usual type of irrigation district bond and are an obligation of the entire irrigation district. The cost of such local improvement, however, is assessed in the usual way against the lands benefited.

The local improvement feature has been put to use by 5 districts in Yakima Valley and by 4 in other parts of the State, the most extensive use having been in Sunnyside Valley irrigation district on the Yakima project. Altogether, to July 1, 1921, there had been formed 40 local improvement districts in these 9 irrigation districts. The average size of the local districts, with the exception of one of disproportionate size formed to cover an entire irrigation district, is 230 acres. To the above date there had been issued against such districts $378,876 of local improvement district bonds, of which $17,912 had been redeemed.

A further application of the local district idea in Sunnyside Valley irrigation district is in the formation of "maintenance districts," a type of organization not provided for by statute but which has proved very satisfactory in this case. The purpose of the maintenance district is to distribute the cost of maintenance on laterals as equitably as possible beyond the point where the Government maintains them. No permanent construction is handled. The farmers do the canal cleaning themselves, choosing a local foreman and arranging the time of work to suit themselves, leaving any repairs to be done by the irrigation district. The maintenance cost is assessed equally to the lands benefited.

Utah and Nevada have also made provision for the formation of local improvement districts, and New Mexico has done so in case of districts formed for cooperation with the United States. The Utah and New Mexico plans are based upon that of Washington, but the Nevada plan differs in many essential details. In none of these States has anything material yet been accomplished by local districts, although one was formed in 1919 in Walker River irrigation district, Nevada.

COOPERATION WITH OTHER DISTRICTS.

Irrigation districts are sometimes authorized to cooperate with other districts, in the same State or in adjoining States, in the construction, acquisition, and operation of irrigation systems. There are numerous instances of intrastate cooperation, particularly in California, Oregon, Washington, Idaho, Colorado, and Nebraska, of which the most notable examples probably are the building of La Grange dam by Modesto and Turlock districts and the Goodwin dam by Oakdale and South San Joaquin districts in California. Cooperation between districts in adjoining States, however, has been limited to a few cases in lower Snake River Valley in Idaho and Oregon. The

way has been paved for eventual cooperation between districts already formed on some of the interstate projects of the Reclamation Service when the districts shall have taken over the operation of the irrigation systems concerned.

DISSOLUTION.

The fact that every district formed is not destined to become operative, and that operating districts may eventually outlive their usefulness, has called for some means of providing for their legal discontinuance. The Wright Act made no provision for dissolution, but subsequent legislation in California and other States has provided for dissolution of districts by the courts, or by the county governing bodies, or by the districts themselves. No district may escape its obligations through disorganization, and the decree of dissolution is dependent upon liquidation of indebtedness.

Of the 158 irrigation districts in the United States classed as inactive, 58 have been formally dissolved.

IRRIGATION DISTRICT DEVELOPMENT.

EARLY UTAH DISTRICTS.

The first irrigation district legislation in the United States was enacted by the Territory of Utah January 20, 1865, providing for irrigation districts within counties, but making no provision for bond issues. This law was immediately put into operation, with the result that a large number of such enterprises were formed during the following quarter-century in various parts of the Territory. No attempt has been made to ascertain the exact extent of operations under this law, for the present investigation has been concerned primarily with the type of district first authorized by the Wright Act; but it is known that the number of early Utah districts was large[5] and it is also apparent that very little in the way of actual construction was accomplished by them.[6] Such districts, then, while created on an extensive scale in an effort to provide a more satisfactory means of organization for irrigation development than had been devised up to that time, had small share in the irrigation achievements of the State and have been generally forgotten in the communities in which they were organized. The few that still exist are thought of rather as companies and bear little analogy to the present-day irrigation districts.

THE WRIGHT ACT.

Following a number of unsuccessful legislative attempts to provide for public irrigation enterprises, and in response to a demand from farmers of San Joaquin Valley, Calif., for a means of organization by which an obstructing minority could be compelled to contribute to the cost of building an irrigation system, California in 1887 passed the Wright Act.[7] This law provided, briefly, that 50 or a majority of freeholders owning lands susceptible of one mode of irrigation from a common source and by the same system of works might propose the organization of an irrigation district by petition to the

[5] George Thomas, in the Development of Institutions under Irrigation, states that a conservative estimate would place the number of such organizations at about 100.

[6] U. S. Department of Agriculture, Office of Experiment Stations Bul. 124, recounts numerous unsuccessful attempts to build irrigation works under this law.

[7] The history of irrigation districts in California from 1887 to 1915 is given in Bulletin 2, California State Department of Engineering, by Frank Adams.

board of county supervisors, which petition, if sufficient in form, must be granted. Thereupon the supervisors were required to call an election at which all electors in the area described were allowed to vote for or against the organization of the proposed district, and for district officers, an affirmative vote of two-thirds of those voting being necessary to authorize formation. If declared organized, the board of directors of the district was given power to acquire, by purchase or condemnation, the necessary property, water rights, and irrigation works; to call elections on the question of issuing bonds, at which a majority of the votes cast was sufficient to authorize a bond issue; to issue and sell bonds in the amount authorized and to use the proceeds for the purchase or construction of irrigation works; to levy annual assessments to meet the interest and principal of outstanding bonds, and to call elections on the question of special assessments; and generally to manage and conduct the affairs of the district to the end that a system of irrigation works should be constructed or purchased, water delivered, and the district obligations paid as due.

The essence of the irrigation district law, then, was the permission given to a part of the residents of a given area to incur indebtedness for which all the lands in such area were held liable. Fifty or a majority of the landowners might propose the organization of a district; but once organized, a majority of the electors voting at any bond election, whether landowners or not, might bond the district in any amount they pleased. The advantage thus given to groups of small landowners is obvious, and just as apparent is the certainty of resulting opposition of unwilling owners of large tracts to a scheme of things which had not yet been tried in the courts and which was soon seen to involve constitutional questions. If those who wished irrigation could have built systems to cover only their own lands, much of the early litigation would have been avoided. But the situation in San Joaquin Valley which gave birth to the Wright Act resulted from the decreasing yields of grain due to farming the land year after year to this one crop and the consequent unprofitableness of dry-grain farming on small areas while large acreages could still be made to yield a profit. At the same time the cost of bringing water to the small areas alone might be prohibitive, yet be entirely within reason if spread over additional adjacent areas. It was to remedy such conditions, and to enable the needed additional areas to be brought within districts, supplied with water, and taxed to pay their proportion of the cost of irrigation, that the irrigation district law was placed on the statute books of California.

As above stated, much litigation arose over the formation and bond issues of the early districts. The objecting landowners claimed that the sale of their lands for district taxes constituted an infringement of the Federal Constitution in that it involved taking property without due process of law. The California State courts held repeatedly that neither the State nor the Federal Constitution was violated, and although in the first Federal case to pass on the question the circuit court held the Wright Act unconstitutional, the United States Supreme Court in 1896 reversed the decision and established for all time the constitutionality of the irrigation district law.[8] The broad ground was taken in this decision that in a State like California,

[8] Fallbrook Irrigation District *v.* Bradley, 164 U. S. 112.

embracing millions of acres of arid lands, the irrigation and bringing into possible cultivation of such areas is a public purpose and a matter of public interest, not confined to the landowners or to any one section of the State, and that an act of the legislature providing for irrigation may well be regarded as an act devoting the water to a public use. The court held, furthermore, that the detailed procedure provided for in the act furnished due process of law.

In the meantime, and while the ultimate fate of the district law was still a matter of conjecture, Washington, Kansas, Nevada, Oregon, Idaho, and Nebraska, in the order named, had enacted similar statutes, following for the most part the phraseology of the Wright Act, but altered to suit local conditions. There was no immediate reaction to the Supreme Court decision in the enactment of additional laws or the formation of new districts, but with the constitutionality of the law thus established the way was paved for the ever-increasing development which began a few years later. All of the Western States, including the tier of States from North Dakota to Texas, have now passed irrigation district laws embodying the principles first expressed in the Wright Act.

With the changes that have taken place since the enactment of the early district laws and the experience the States have had with the actual operation of districts, it has been inevitable that frequent and radical alterations and additions should be made to the original laws. Even at the present time, although the fundamental principles of the irrigation district type of organization may be considered as well settled, there are many details of formation and operation that are still undergoing change.

EARLY DISTRICTS UNDER THE WRIGHT ACT.

Three States soon followed California in passing irrigation district statutes, but actual operations prior to 1895 were confined to California and Washington. Little was accomplished at this time in Washington, for only two of the seven districts formed issued bonds and none did much in the way of construction. In California, however, extensive operations were carried on, the results of which may be summarized in the statement that 49 districts were organized, of which 26 went beyond the point of organization and seriously attempted to function, and that only 8 of these have survived to the present day, 6 of the 8 having been compelled to pass through financial reorganizations before their survival became assured. Furthermore, of the $7,917,850 of bonds issued by the early districts only $2,000 was paid in full, $2,601,000 having been refunded at varying discounts, $2,589,800 compromised at various figures and canceled, $2,126,750 held illegal, and $598,300 with no settlement yet effected.

With an initial handicap of this magnitude to be overcome, the present extent and increasing favor in which irrigation districts are held are the best testimonials that could be offered to the inherent soundness of the irrigation district, properly safeguarded, for certain types of irrigation development. After all, this early record is no worse than those of many other pioneer undertakings, and when one reads of the deliberate repudiation of obligations by certain States and municipalities when hard pressed financially, and of the extensive losses in railroad and other corporate investments in the early years

of their activities, it is realized that the difficulties in which so many irrigation districts became involved, before the idea of speculation became generally superseded by that of effective State control, are not unique in financial annals.

A great many of the early districts were involved in litigation on one point or another, largely as the result of the opposition of landowners unwillingly included, although the earliest districts were undoubtedly bona fide enterprises and free from speculative features. After a few years, however, speculation and promotion of irrigation district schemes became rife and brought with it the train of misfortune that usually follows such unhealthy development. It is true that the bonding of irrigation enterprises was a new departure in irrigation development in the United States and that much had to be learned of the soundness of and security for such bonds; but it is also true that excessive optimism, fraud, carelessness in the matter of water supply, and the use of this new means of promoting land sales entered largely into many district enterprises. On the other hand, some legitimate and entirely feasible undertakings that were started were carried under in the reaction that followed the panic of 1893. Several of the feasible districts managed to weather the storm and eventually to effect bond settlements which have been the forerunners of their present unquestioned success.

THE PERIOD OF CONSERVATIVE DEVELOPMENT.

Following the close of the first and generally disastrous phase of development no districts were formed for some years in any State but Nebraska. With the beginning of the present century, however, irrigation district activity began in Idaho and Colorado, shortly followed by Oregon, on a very conservative scale at first, but eventually increasing in extent, particularly in Colorado, until by the end of the first decade very many districts of a speculative character were issuing and disposing of bonds. Although no definite date can be assigned as marking the close of the second period of district development, owing to the fact that it gradually merged into the third phase, the years 1906 and 1907 represent approximately the turning point.

The conservatism shown in the formation and bonding of irrigation districts and the good that resulted during this period, while not so spectacular as the financial failures of the preceding and immediately following years, are deserving of more than passing comment. In Nebraska and Idaho, and to a less extent in Colorado, the district was used largely for the purpose of taking over and reconstructing existing irrigation works, issuing bonds directly in payment for the works in some instances or selling them locally for improvements, the bonds thus being issued against an already established security and with an already developed earning power sufficient to pay the interest and principal of the bonds in addition to the cost of maintaining and operating the irrigation system. Such districts generally succeeded. Several Nebraska districts have completely discharged their bonded indebtedness, and others in all of the States mentioned have paid interest promptly and have retired such portions of the principal as have fallen due. This situation affords a striking contrast to the two eras of speculation in irrigation district bonds.

THE PROMOTION PHASE.

The third phase, or second period of promotion, reached its climax about 1910 and ended two or three years later. The principal activities were in Colorado, but extended to Wyoming, Utah, Idaho, and Oregon as well. Colorado, however, for reasons stated below, provided the most fertile and extensive field for speculation and furnished most of the financial failures.

The promotion of irrigation districts at this time was not an isolated feature of irrigation development but was practically contemporaneous with Carey Act development in the Northwest. Activities under the Carey Act were largely centered in Idaho and Wyoming,[9] in which States there were not so many speculative district enterprises. On the other hand, the irrigation district idea claimed most of the attention of Colorado promoters. Speculation in irrigation projects was prevalent at the time and became identified with the irrigation districts in Colorado because of the lack of safeguards then provided by the irrigation district laws against its abuse. The promoter was not working alone in his efforts for large and immediate profits, but was ably seconded by landowners and bond dealers, many of whom had but one thought in mind—to exploit the situation to its utmost extent, and then "to get from under." The result was a repetition of the early California experience, with a nation-wide discrediting of irrigation securities which affected good irrigation bonds as well as poor ones and from which the irrigation bond market has not, even yet, fully recovered. Not all Colorado districts organized at this time were of this type. Many were perfectly worthy and feasible enterprises, but the effect of the large number of defaults and compromises on the investing public has greatly overshadowed the fact that Colorado has some excellent districts that have paid all obligations promptly as due.

DEVELOPMENT IN THE SEVERAL STATES.

The foregoing discussion has dealt with irrigation district development in the Western States as a whole. The extent and rapidity of development in each State are shown in Tables 1 to 3, inclusive, and the character of such development is here briefly summarized:

Arizona.—The first irrigation district law of Arizona was approved May 18, 1912, and the latest complete enactment was in 1921. The small amount of development that has yet taken place has occurred mainly in the lower Colorado and lower Gila Valleys near Yuma and in the territory bordering the Salt River Valley project about Phoenix.

California.—The conditions which led to the enactment of the Wright Act March 7, 1887, and the operations under that law have already been touched upon. In 1897 an entirely new law was passed which as amended is still in force. Among other changes made by the act of 1897, the procedure for formation of districts and for issuing bonds was altered in an attempt to avoid further district disaster. For 12 years after this reenactment no new districts were formed in California, the main activity being concerned with winding up the affairs of insolvent districts and with solving the problems still faced by the few old districts that proved successful.

[9] Irrigation under the provisions of the Carey Act. By Guy Ervin, U. S. Dept. Agric. Circular 124.

The second period of activity in California began about 1909, in which year two important districts were formed to extend an irrigated area contiguous to the successful Modesto and Turlock irrigation districts, and since 1913 has continued unabated. Due to the bitter lessons learned in the early years, the weak features of the old districts have been generally absent from those more recently formed. The State has jealously guarded its good name and the State engineer has refused to sanction a number of enterprises which appeared to him undesirable. But interest in irrigation development by districts has been so widespread throughout the State during the past four or five years that the disappointed petitioners in some cases have succeeded in overriding the State engineer's disapproval and in having their districts organized. Especially during the period immediately following the war, irrigation districts were being organized on an extensive scale and were finding the disposal of their bonds a comparatively easy matter. It became possible even to sell some bonds which had been refused certification by the State. But following the change in the general economic situation during the early fall of 1920 there became evident a more conservative attitude on the part of the bond-investing public and consequently greater discrimination in the choice of irrigation securities. As a general rule now the market will not absorb uncertified issues.

The majority of districts formed during the first period were located south of the Tehachapi, but by far the greatest activity during the present period has been confined to Sacramento and San Joaquin Valleys. A few recently organized districts have been located in southern California and a few in the northeastern section of the State.

In spite, therefore, of mistakes made and damage done in the early years, much has been accomplished under the irrigation district law in California, notably in the reorganization and extension of existing systems and to a lesser degree in the development of new enterprises. The early antagonistic influences are not now active. The adaptability of the district law to given conditions and the advantages and limitations of such type of organization are much better known than they were 35 years ago. Certain early mistakes—particularly the construction of works without adequate engineering investigation or economic justification, and the promotion of districts in wholly undeveloped sections where established values furnish inadequate security for bond issues—are much more carefully guarded against than formerly. While the financial condition of a few of the newer enterprises was unsatisfactory in 1921 as a result of the drop in prices of farm products the year before, such condition was exceptional. On the other hand, many successful California districts bear testimony to the adaptability of the irrigation district, properly safeguarded, for conservative irrigation development.

Colorado.—The first district act was approved April 12, 1901. The latest complete enactment came in 1921 as a result of the efforts of the irrigation district finance commission, which had been created in 1919 to examine into the causes of success or failure of Colorado districts with a view to recommending means for preventing further failures.

Early development in Colorado was generally conservative and dealt largely with the extension and improvement of existing systems.

It was not until 1907 that the formation of irrigation districts for new development began to take place on any considerable scale. About that year, however, when interest in irrigation was becoming widespread and was attracting an increasing amount of attention from eastern investors, it began to appear that large profits might be made through the reclamation of areas on the plains east of the Rocky Mountains. Sufficient time had elapsed since the early California failures to lessen the prejudice against irrigation district bonds, and Carey Act bonds in the meantime had been selling well, so that with the recovery from the financial stringency of 1907 it became possible to market such securities with comparative ease. Therefore, with no control on the part of any State official to act as a check, the allurements of large returns visualized by promoters, bond dealers, and landowners led during the next few years to the rapid organization of irrigation districts and to the issuance of bonds and expenditure of the proceeds in many cases without adequate water-supply and engineering investigations. Some projects were fraudulently financed and constructed; others were entirely honest; but the general tendency of the times was to overestimate available water supplies, and it is this feature that has led to most of the troubles from which districts formed at that time have suffered. Finally in 1912 and 1913, following the default of interest on bonds of several districts and the failure of an eastern bond house which had been financing Carey Act and district enterprises, it became impossible to dispose of further district bonds. New development by irrigation districts practically ceased in 1913 and to the end of the year 1921 had not been resumed.

All district activity after 1907 was not by any means concerned with speculation. Several of the most successful districts in the State were organized during that period, and other thoroughly commendable projects were proposed but were unable to sell bonds. Over against the failures of this period of speculation, with their unfortunate effect upon legitimate irrigation district development in Colorado and other States, must be set the records made by many very successful districts in Colorado which have accomplished much in the way of reconstructing and extending irrigation systems and in providing additional water supplies for the irrigation of late-season crops. It is not questioned in Colorado that the irrigation district has proved well adapted to this form of development. Eleven Colorado districts, with a combined original bonded indebtedness of $2,939,000 have already redeemed nearly one-fourth of this amount and several others are about to begin bond redemptions.

Most of the irrigation districts in Colorado are found in the valleys of the South Platte, the Arkansas, the Rio Grande, and the Colorado (formerly known as the Grand River), the largest number having been formed in South Platte Valley. A few districts were located in other portions of eastern Colorado and in the extreme northwestern and southwestern parts of the State.

Idaho.—The first district act was passed March 9, 1895, and the latest complete enactment is found in the Idaho Compiled Statutes of 1919. Development did not begin until 1900 but has been fairly steady since then, only one year having passed without witnessing the formation of at least one district. The greatest interest in the formation of new districts was in 1920.

During the first decade of the present century, which was a period of great activity along all lines of irrigation development in the West, comparatively few irrigation districts were organized in Idaho and they were essentially conservative enterprises. At the same time Carey Act projects were being initiated on a large scale and the widespread interest they created, coupled with the fact that conditions were not quite ripe for financing irrigation districts, caused the idea of new development by means of districts to be lost sight of temporarily. The type of early district development is shown by the fact that 11 of the first 13 irrigation districts were designed to take over the ownership and operation of existing irrigation works, and that these 11 districts are to-day and always have been among the soundest financially in the entire West.

About the year 1909, which marked the height of similar activity in Colorado, irrigation districts in Idaho began to share the attention of promoters with the result that 3 of the 4 districts formed in that year and 11 of the 20 districts organized from 1909 to 1913, inclusive, were connected with the development of entirely new projects. Since 1913, however, there has been comparatively little activity of this type in Idaho, for most of the districts formed since that time have had in view either the taking over and operation of existing projects or the construction of storage reservoirs to supplement water supplies for at least partially developed areas.

The great majority of districts lie in the Snake River Valley from St. Anthony, in Fremont County, to Weiser, in Washington County. A few are found in the valleys tributary to Snake River, and still others in the extreme southeastern and northwestern parts of the State.

The number of irrigation districts in Idaho that have not been successful is remarkably small. Four-fifths of the districts actually operating were formed to take over irrigation systems in already developed communities, and these districts are the ones that have had the least trouble. Cases of failure to meet obligations in this group are very few. On the other hand, the districts formed to construct new systems or to purchase newly constructed irrigation works in relatively unsettled communities have often been hard pressed to meet their obligations and in some instances have been unable to do so. Hence the general use of the irrigation district to purchase and operate going concerns, or to provide funds for extensions and improvements, or to furnish supplemental water supplies for late irrigation, in communities where the security behind the bond issue has been already established and where settlers have been sufficiently numerous to carry the burden of taxation, has undoubtedly been one of the greatest factors making for success. Then the provision for even a limited measure of State supervision over the organization and plans of construction has certainly acted as a check upon ill-advised schemes. Prudent and economical management and a capacity for getting together have also saved the day in more than one difficult undertaking.

Kansas.—Although Kansas has had an irrigation district law on its statute books since March 10, 1891, no district, so far as could be ascertained, has ever been formed in the State. All of the larger irrigation projects had been constructed and put into operation before the law was enacted and development since that time has

been carried on largely by individuals. The lack of interest in this subject is reflected in the composition of the irrigation district law, which was passed at a time when legislation affecting districts was in its infancy and which has been practically unchanged since that time. Radical amendments or a complete reenactment would be necessary before irrigation district development could take place on any considerable scale under present economic conditions.

Montana.—Montana's first irrigation district law was approved March 4, 1907. Two years later a new law was substituted which as amended is in force to-day, and which is found in the Revised Codes of 1921. An alternative method of organization and government under State supervision was provided in 1919 for such districts as should elect to come within the provisions of the irrigation commission act.

Development that has already taken place has been almost entirely concerned with improving and enlarging existing irrigation systems, and little has been accomplished by districts in the reclamation of arid lands. General interest in irrigation in Montana has been rather spasmodic and has usually resulted from the effects of a series of droughts upon the dry-farming communities of the State, which helps to explain the fact that 36 of the 61 districts organized to date were formed in the two years 1919 and 1920 after a series of three dry summers. On the other hand, interest in irrigation is apt to lag in times of high market prices for grain. So it is questionable whether all of the projects for new development now proposed will be carried through in case climatic conditions and prices in the immediate future should be more favorable to the production of dry-farming crops. The most sustained demand for irrigation district development in the past has come from those sections of the State where farming under irrigation has been carried on for some time.

The history of irrigation districts in Montana deals largely with those organized in the earlier years. Most were conservative enterprises formed in response to a real demand for the district type of organization, and in the main they have been successful. Some have encountered serious difficulties which have been traceable in part to a divided interest in irrigation, but most districts have been able to pay their obligations promptly.

Districts are scattered over many portions of the State, a large proportion, however, being found in Yellowstone Valley.

Nebraska.—Although the seventh State in point of time to pass an irrigation district statute, Nebraska was the third to witness the actual formation of districts and was practically the only State in which districts were being organized in the last five years of the nineteenth century. Following a series of disastrous droughts during the early nineties, the irrigation district law was approved March 26, 1895, practically contemporaneously with an irrigation code, both as the outcome of insistent demands upon the part of farmers in the western part of the State. Interest was immediate and widespread, with the result that nearly half of the 39 districts formed to date were organized in the four years following the passage of the act. But with the return of favorable growing seasons in 1898 and succeeding years, interest began to wane, particularly in the easternmost areas, so that 9 of the 18 districts organized up to that time were soon abandoned.

Although the marked effect of wet and dry years upon district history in Nebraska has continued, all of the districts formed since 1900 are active to-day. The latest complete district law is found in the Revised Statutes of 1913.

All but three of the operating districts lie in the North Platte Valley from the Wyoming State line to the city of North Platte and depend for their water supply upon the North Platte and two northern tributaries. The other districts are on Lodge Pole Creek and on South Platte and Republican Rivers. Most of the now inactive districts were located along Platte River and in the Loup River drainage basin.

The geographical position of Nebraska on the border line between the humid and semiarid regions of the United States has had much to do with the character of irrigation district activity in the State. The influence of droughts upon early district activity has already been pointed out. Since 1900 the recurrence of seasons unfavorable for dry farming has not stimulated to any extent the formation of districts for new development. But due to the fact that irrigation in some years is not necessary to the successful production of crops, many farmers accustomed to use water only in dry years refused to pay assessments to the canal companies in seasons when water was not needed, with the result that the finances of the companies suffered severely. This situation led directly to the formation of irrigation districts to take over the canal companies and by the use of their taxing power to compel the payment of assessments in every season. The districts so formed have been much more successful than were the companies they replaced. Then the districts often bought out these systems at cost or less than cost, so that there were no large promotion profits to be absorbed. The district enterprises for the most part are small, there being only one in operation covering more than 15,000 acres and most of them ranging from about 2,000 to 8,000 acres in size. Engineering problems have not been complicated, the supply of water has been generally sufficient for the amount of land to be irrigated in an average season, and maintenance expenses as a rule have not been high, with the result that interest on outstanding obligations has for the most part been paid promptly as due and a large part of the principal indebtedness has been retired.

Nevada.—The first irrigation district act was passed March 23, 1891, and the latest complete enactment was in 1919. Activity has been confined to the past few years and has been quite limited in extent, only two districts being in operation, of which one covers the lands of Newlands project. All districts organized have been designed to cover partially irrigated areas.

New Mexico.—The first law was enacted March 18, 1909. In 1919 two separate acts were passed, one relating to irrigation districts not cooperating with the United States and the other to districts formed for the purpose of such cooperation.

There has been no period of great activity along irrigation district lines in New Mexico. The two earliest districts were abandoned without material accomplishment. Three of the four districts now operating were formed for the purpose of taking over existing irrigation works and the fourth to succeed the water users' association on the New Mexico portion of Rio Grande project.

North Dakota.—This State, the most recent to enact irrigation district legislation, placed its law on the statute books March 8, 1917.

Only two districts have been formed, both in connection with Federal reclamation projects.

Oklahoma.—The Oklahoma statute was approved March 29, 1915. The only district yet organized was formed in connection with the proposed construction of Lawton project by the Reclamation Service in 1917. Construction was deferred, however, owing to the establishment of a military post at Fort Sill and the need there for all available water, and has not yet been resumed, so that for the time being the district is inactive.

Oregon.—The irrigation district law of Oregon was approved February 20, 1895, the latest complete enactment being in 1917. Little development took place for some years after the passage of the first act. Beginning with 1904, however, there have been three distinct periods of activity, namely, 1904 to 1906, 1910 to 1913, and 1915 to the present time. The most pronounced activity has been since 1916.

More than half of the active districts are still in preliminary stages, due in part to the fact that some are of very recent origin, but largely because of the difficulty of selling bonds. The State has done much to further legitimate irrigation development, and through the reenactment of the district law in 1917, the provision for certification of bonds, and lately the new departure in the matter of payment by the State of interest on district bonds, has made possible the sale of large amounts of bonds and the development of numerous projects. But districts have been formed and bonds voted on such an unprecedented scale during the past few years that the irrigation district bond market, never an eager one at best, has been unable to absorb so many issues. The result has been that some districts formed even for supplemental development have found the disposition of their securities more difficult than had been anticipated and others for this reason have delayed voting bonds until the market should appear more favorable.

With a few scattering exceptions the Oregon districts fall into six general groups: (1) Hood River Valley; (2) Umatilla and Columbia River Valleys; (3) the inland plateau; (4) Rogue River Valley; (5) Klamath Valley; (6) Snake River, Malheur, and smaller tributary valleys. The last-named area has been the scene of several attempts to provide for irrigation on an extensive scale, only one of which has been accomplished. District development in this area is closely associated with that on the Idaho side of that portion of Snake River Valley, involving cooperation and the use of common water and power supplies by districts on both sides of the State line.

In spite of the large number of irrigation districts in Oregon, the life history of most of them has been so short that generalizations as to their operation can not be readily made. Some work has been unwisely done, and some districts, in common with other types of irrigation enterprises, that have had to depend upon the return from hay and grain crops have been hard pressed financially during the recent period of low prices for such products. However, with very few exceptions the Oregon districts have met their bond obligations when due.

South Dakota.—The district law was enacted March 2, 1917. As yet no districts have been organized, although the formation of two is contemplated.

Texas.—Texas first provided for the creation of irrigation districts on April 15, 1905. The law has been twice completely reenacted, the latest revision having been in 1917. Practically all development has taken place since 1913 and has been fairly uniform, having been predominantly for taking over and improving existing irrigation systems.

The largest group of districts in the State is found in the lower Rio Grande Valley from McAllen to Brownsville. All of the systems in this region were originally built, independently of each other, as parts of land-selling enterprises. After a few years of operation, however, some of the irrigation companies became financially involved and it became necessary for the settlers to take over and operate the irrigation systems in question, which led to the formation of eight irrigation districts. These districts have almost invariably made extensive improvements and enlargements and one has reconstructed its irrigation system on such a scale that the work has amounted practically to new development. All systems in the valley derive their water supplies from the Rio Grande by pumping.

A smaller group of districts lies in Pecos Valley and tributary valleys in Ward, Reeves, and Pecos Counties. These districts were all organized to take over going concerns and generally to improve them and to provide additional water by storage. The remaining districts are found in Wichita County, in the Gulf coast counties of Matagorda and Nueces, and on the Rio Grande project in El Paso County.

Utah.—Mention has been made of the early Utah districts. The last of the early district laws was repealed in 1898, and it was not until March 22, 1909, that a law based upon the Wright Act was passed, which law was completely revised in 1919.

The law of 1909 was enacted at a time of widespread district activity in the Rocky Mountain States and resulted in the rapid organization of districts in Uintah Basin of Utah. Very little real development was accomplished at this time, however, and there was no further activity until 1917. The years 1920 and 1921 brought forth considerable interest along district lines, all districts proposed being intended to provide for the further development of communities already partially supplied with water. The greater part of the district activity has been centered in Cache Valley, Salt Lake Valley in Weber and Davis Counties, Utah Valley, and Uintah Basin.

With one exception the early districts faced great difficulties. Although nearly all were formed to acquire irrigation systems already partly constructed, nevertheless most of them were located in pioneer communities and suffered from lack of adequate transportation and great distance from markets, excessive overhead costs, lack of capital, and damage to the canal system. One early district, however, and most of those formed within the past few years have been more favorably located.

Washington.—With its enactment of March 20, 1890, Washington was the first State to follow California in authorizing the creation of irrigation districts. The law then passed was nearly identical with the Wright Act, but included also the amendatory and supplemental California acts of 1889. The latest codification of irrigation district laws was in 1915.

The history of irrigation districts in Washington parallels to a certain extent that of California, although the early experience in Washington was neither so extensive nor so disastrous as that in California. District development occurred only in these two States in the early nineties, was affected by the financial panic of 1893, ceased in both States at about the same time, and was revived almost simultaneously a decade and a half later.

Little was accomplished by the early districts. Interest was revived in 1911 and has since been continuous, the greatest activity having occurred in 1917 and 1920. The Washington districts fall mainly into the following five groups: (1) Puget Sound region; (2) Okanogan, Methow, Columbia, Wenatchee, and tributary valleys in Okanogan, Chelan, and Douglas Counties: (3) Yakima and Columbia River Valleys in Kittitas, Benton, Franklin, and Walla Walla Counties: (4) Walla Walla Valley; and (5) Spokane Valley. By far the most extensive development has taken place in Yakima Valley and has been closely identified with the activities of the United States Reclamation Service on Yakima River.

There have been very few district failures in Washington, and not more than one district at the present time is failing to discharge its obligations as they become due. This fortunate situation is due in large measure to the conservative character of development that has actually taken place and to the fact that relatively few bonds have been sold for construction of irrigation systems where the value of the security did not exist prior to the bond sale. The principal district activity has occurred since the failures elsewhere during the first decade of this century and has been influenced by the fact that bond investors were no longer ready to lend money freely toward the reclamation of arid land. As a matter of fact, the United States has financed the construction of five of the nine operating districts which have developed new works, and only one of the others was constructed in a community where high values had not already been established. This attitude on the part of bond buyers is reflected in the fact that, aside from obligations contracted with the United States, the amount of money loaned to irrigation districts since 1911 has been $4,321,530 for supplemental development as against $1,046,900 for new development, of which latter figure 60 per cent was furnished by a railroad company which was interested in the development of a project and 25 per cent additional was used only for preliminary expenses and the acquisition of rights by other projects for the actual construction of which bonds have not been sold. Another comparison in point is that the area included in operating districts in which new development was undertaken is 36,000 acres, whereas there are approximately 1,014,000 acres in undeveloped projects under district organizations the reclamation of which must await the sale of many millions of dollars worth of bonds. Irrigation district achievement in Washington, therefore, while very considerable, has been overwhelmingly along the lines of the reorganization and betterment of existing irrigation systems.

Wyoming.—The irrigation district law was first enacted February 19, 1907, and was completely revised in 1920. Early activity practically ceased in 1911 with the collapse of the bond market and was not revived until 1920. Only two of the seven early districts

are operating successfully at the present time. These two districts disposed of bonds for construction in already settled communities, whereas those districts formed to finance development in pioneer communities have had great difficulties. Activity during the past two years has been of a conservative type.

SUMMARY AND CONCLUSIONS.

The irrigation district is a public, cooperative organization for providing water for irrigation and taxing the land to pay for it.

The Wright Act of California, passed in 1887, has provided the basis for irrigation district legislation in the 16 other Western States.

To December 31, 1921, 598 irrigation districts had been organized in the 17 Western States, of which 244 districts were then in operation, 37 under construction, 159 in preliminary stages, and 158 inactive. The area covered by the 598 districts was 15,892,995 acres. In 1921 approximately 2,857,400 acres were irrigated by districts. Fifty-eight per cent of all districts were formed for supplemental construction or the acquisition of existing systems and 42 per cent for entirely new development.

Qualifications of voters at district elections in most States include property qualifications, particularly in creating indebtedness.

The irrigation district is managed by an elected board of directors, composed usually of landowners and electors. Finances are handled in some States by district officials, in others by county officers, and in still others by both district and county officers.

District assessments for cost of construction or acquisition of works are based in some States upon the value of the land, are uniform upon all lands in others, are apportioned according to the benefits in still others, and in one State according to water allotment. The ad valorem and benefit methods afford the greater flexibility in levying assessments. Assessments for cost of operation are sometimes on a different basis and may usually be supplemented or superseded by tolls for water.

Bond issues must usually be authorized by vote of the electors. Interest rates, denominations, and maturities vary according to statutes. Experience has led certain States to make selling price limitations and interest requirements less stringent, leaving the security to be safeguarded by State supervision. Refunding bonds may be issued in the majority of States.

The bond market has at times been extensive and at other times practically nonexistent. It is confined at present mainly to the irrigation States, though a few issues have been sold recently in Chicago, St. Louis, and New York. Efforts are being made to reestablish an eastern market.

Irrigation district bonds have been of two classes—nonspeculative and speculative. Defaults have been confined largely to the speculative group. Seventy-one per cent of all bonds sold by irrigation districts to December 31, 1921, had been paid when due, both as to principal and interest. During the period 1915–1921 less than 1 per cent of bonds sold were unpaid, due largely to more effective State control, State certification of bonds, greater discrimination by bond investors, and more general conservatism in district promotion. To December 31, 1921, $118,436,443 of bonds had been sold, of which $104,921,223 were outstanding.

Supervision over district activities by State officials is general. Supervision applies to formation of districts, to plans and estimates of construction, and to certification of bonds as legal investments for trust and savings funds. State control has exercised a moderating influence upon the organization and financing of districts and made the promotion of unfeasible projects more difficult.

Financial aid to irrigation districts, in the interest of development of the State's resources, has been granted to a limited extent in two States and is engaging attention in other States.

Districts have cooperated extensively with the United States Reclamation Service in connection with Federal reclamation projects and have superseded the water users' associations in some cases.

Distribution of water is pro rata to all lands in some States, according to beneficial use in others, and according to the value of the land as provided by several statutes. Actual practice has seldom developed a distribution according to land values because of possible inequities.

Districts are granted the power of eminent domain, construction of drainage works, and sometimes development of electric power.

Municipalities may be included in districts in some of the States. Public lands of the United States may now be included under the provisions of an act of Congress. Several States permit State lands to be included.

Local improvement districts within irrigation districts may be organized in four States and have been put into successful operation in Washington.

Cooperation with other districts in the same State is not uncommon. Cooperation with districts in adjoining States has seldom occurred.

Districts may be legally dissolved upon liquidation of indebtedness. Fifty-eight districts in the United States have been dissolved.

Failures among irrigation districts have resulted from opposition of principal financial interests in the district, unproductive lands, inadequate water supply, overcapitalization, faulty engineering, and principally from insufficient settlement of land. Formation and financing of districts under such conditions have been due to overoptimism of landowners, manipulations of promoters, connivance of some bond houses, inexperience in district possibilities and limitations, absence of official restraint, and marketing of speculative bonds without their true character being known to purchasers.

Successes among irrigation districts have been mainly among districts formed for acquisition of going concerns, extensions, betterments, cooperation with the United States, and for new construction in partially developed communities or in sections where development has followed rapidly.

The essentials of success have proved to be productive land, sufficient water, reasonable capitalization, and adequate land settlement.

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